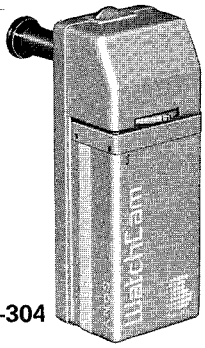
HNS-16A FDM-404A HVM-304

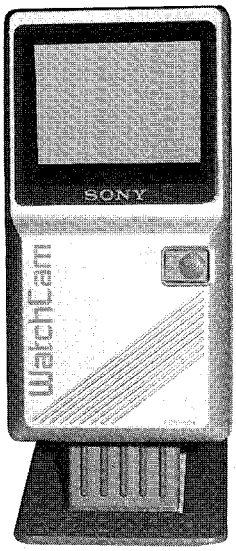
SERVICE MANUAL

AEP Model

V436



HVM-304



FDM-404A

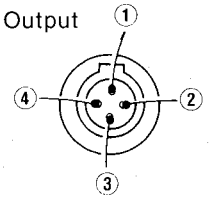
April, 1986

WatchCam

SPECIFICATIONS

HVM-304 black-and-white video camera

Image pickup tube	1/2-inch B/W SATICON™ tube
Signal system	CCIR standards
Scanning system	625 lines, 2:1 interlace
Frame	25 frames/sec.
Sync system	Internal
Scanning frequency	Horizontal 15.625 kHz Vertical 50 Hz
Lens	f = 11 mm, F1.8, fixed focus, auto-iris
Automatic controls	Auto-gain and auto-beam control
Minimum illumination	5 lux (10 lux when the camera mount and fish-eye lens are incorporated)
Output	4P MULTI connector ① DC input ② Video output ③ Ground ④ Audio output
	Video, 1.0V p-p, 75 ohms, sync negative
	Audio, −5dBs (436 mVrms) less than 10 kilohms
Input	Power, 5.1 through 15V DC, 6V DC normal
Microphone	Built-in electret condenser type
Power consumption	Approx. 0.9W when the auto-iris is opened
Dimensions	Approx. 52 × 32 × 100 mm (w/h/d) (2 1/8 × 1 5/16 × 3 15/16 inches)
Weight	Approx. 170g (6 oz)

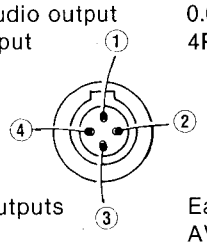


Camera mount

View angle	Approx. 150 degrees (diagonally)
Door lens	Lens structure, 4 groups 5 elements Afocal system
Relay lens	Lens structure, 8 groups 8 elements Afocal magnification × 0.58 with special bayonet mount

FDM-404A flat black-and-white monitor

TV system	CCIR standards
Picture tube	Flat black-and-white 4-inch (10 cm) picture measured diagonally
Speaker	Approx. 3.6 cm (1.5 inches) dia.
Audio output	0.05W (7.2 ohms)
Input	4P MULTI connector ① 6V DC output ② Video input: 1.0V p-p, 75 ohms, sync negative ③ Ground ④ Audio input: −5 dBs (436 mVrms) more than 30 kilohms
Outputs	Earphone jack (minijack) AV OUT (AV uniconnector) Video output: 1.0 Vp-p, 75 ohms, sync negative Audio output: −5 dBs (436 mVrms), less than 10 kilohms



MICROFILM

CAMERA AND MONITOR SYSTEM

SONY®

ACC

Power requirements	6 V DC DC IN 6V jack accepts: supplied AC power adaptor for use on 220 V AC, 50 Hz or optional DCC-40A car battery cord for use on 12V
Power consumption	Approx. 3.3W
Dimensions	Approx. 110 × 210 × 46 mm (w/h/d) ($4\frac{3}{8} \times 8\frac{3}{8} \times 1\frac{13}{16}$ inches)
Weight	Approx. 720 g (1 lb 9 oz)

AC-40E AC power adaptor

Input	220 V AC, 50 Hz
Output	6V DC, 700mA
Dimensions	66 × 59 × 117 mm (w/h/d) ($2\frac{5}{8} \times 2\frac{3}{8} \times 4\frac{5}{8}$ inches)
Cord length	2.25 m (7 feet 4 inches) (with AC power plug) 2 m (6 feet 8 inches) (with DC plug)

Optional accessories

Camera extension cable VK-110 (10 m, 33 feet)
Camera cable VK-120A (20 m, 66 feet)
Plug adaptor VMC-140
Audio/video connecting cable VMC-612MS (2 m, 6 feet 8 inches)
Car battery cord DCC-40A
Earphone
Wide attachment lens VCL-06HS
Tripod attachment VCT-01

Design and specifications are subject to change without notice.

SAFETY-RELATED COMPONENT WARNING !!

COMPONENTS IDENTIFIED BY SHADING AND MARK ⚠ ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY. CIRCUIT ADJUSTMENTS THAT ARE CRITICAL TO SAFE OPERATION ARE IDENTIFIED IN THIS MANUAL. FOLLOW THESE PROCEDURES WHENEVER CRITICAL COMPONENTS ARE REPLACED OR IMPROPER OPERATION IS SUSPECTED.

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SECTION 1
GENERAL

1-1. FEATURES

Your portable, compact, easy-to-install camera and monitor system will play an important security role as a doorkeeper at the front door or a baby-sitter in the playroom. System connection and installation are well-designed and simple. Just follow the instructions in this manual.
Besides its surveillance capability, this system has a wide range of uses possible by adding optional units.

Black-and-white video camera...HVM-304
- Truly compact and light-weight
- Less gain loss and lower power consumption
- SATICON™ B/W half-inch tube is incorporated.
- Auto-iris, auto-gain and auto-beam control assures steady shooting and clear pictures.
- Equipped with 4-pin connector for video and audio outputs
- Quick-start when the POWER switch of the monitor is pressed
- Built-in electret condenser microphone
- Supplied camera cable (20 m, 66 feet) can be extended up to 60 m (198 feet) by using 4 optional VK-110 camera extension cables (10 m, 33 feet each).

Flat black-and-white monitor...FDM-404A
- Miniature B/W monitor for portable or desktop use
- 4-inch flat black-and-white picture tube
- Recessed tilted screen for comfortable viewing
- Built-in 1.5-inch speaker
- DYNAMIC FOCUS increases sharpness over the entire screen
- DC IN 6V jack for connecting to the AC power adaptor
- Equipped with 4-pin connector for 6V DC output and video and audio inputs
- AV uniconnector for audio and video output to connect another FDM-404A monitor (optional) for multi-monitor system.

1-2. YOUR KIT INCLUDES

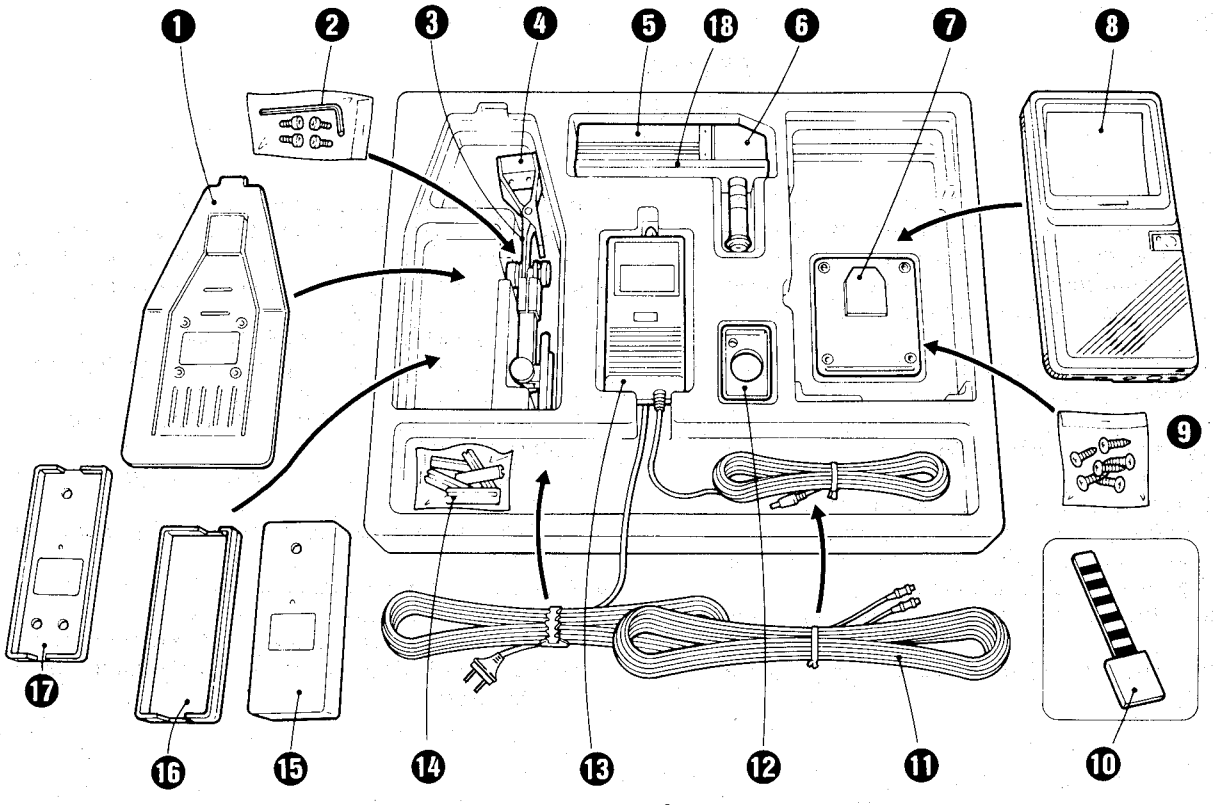
❶ **Stand** for the monitor
❷❸**Camera holder** (L-shape wrench and screws supplied) to position the camera near the subject to be watched
❹ **Bracket**
❺ **Camera** (HVM-304)
❻ **Camera mount** with fish-eye lens and camera mount chassis
❼❾**Wall plate** (screws supplied) to hang the monitor on the wall
❽ **Monitor** (FDM-404A)
❿ **Scale** to measure door thickness (packed separately, in the vinyl bag of the instruction manual)
⓫ **Cable** (20 m, 66 feet) to connect camera and monitor
⓬ **Camera hood** to be used when the camera is on the camera holder
⓭ **AC power adaptor** (AC-40E) to supply the power to the monitor and camera
⓮ **AC plug adaptor** (attached to the AC power cord plug)
⓯ Adhesive-backed **cable clips**
⓰ **Spacer**
⓱ **Frame**
⓲ **Camera mount chassis**

Other tool or parts required for installations:
Masking tape
Phillips head screwdriver (6 mm dia.)
Screws (P4 × 20, P4 × 25)

MODEL NUMBER OR PART NUMBER LIST

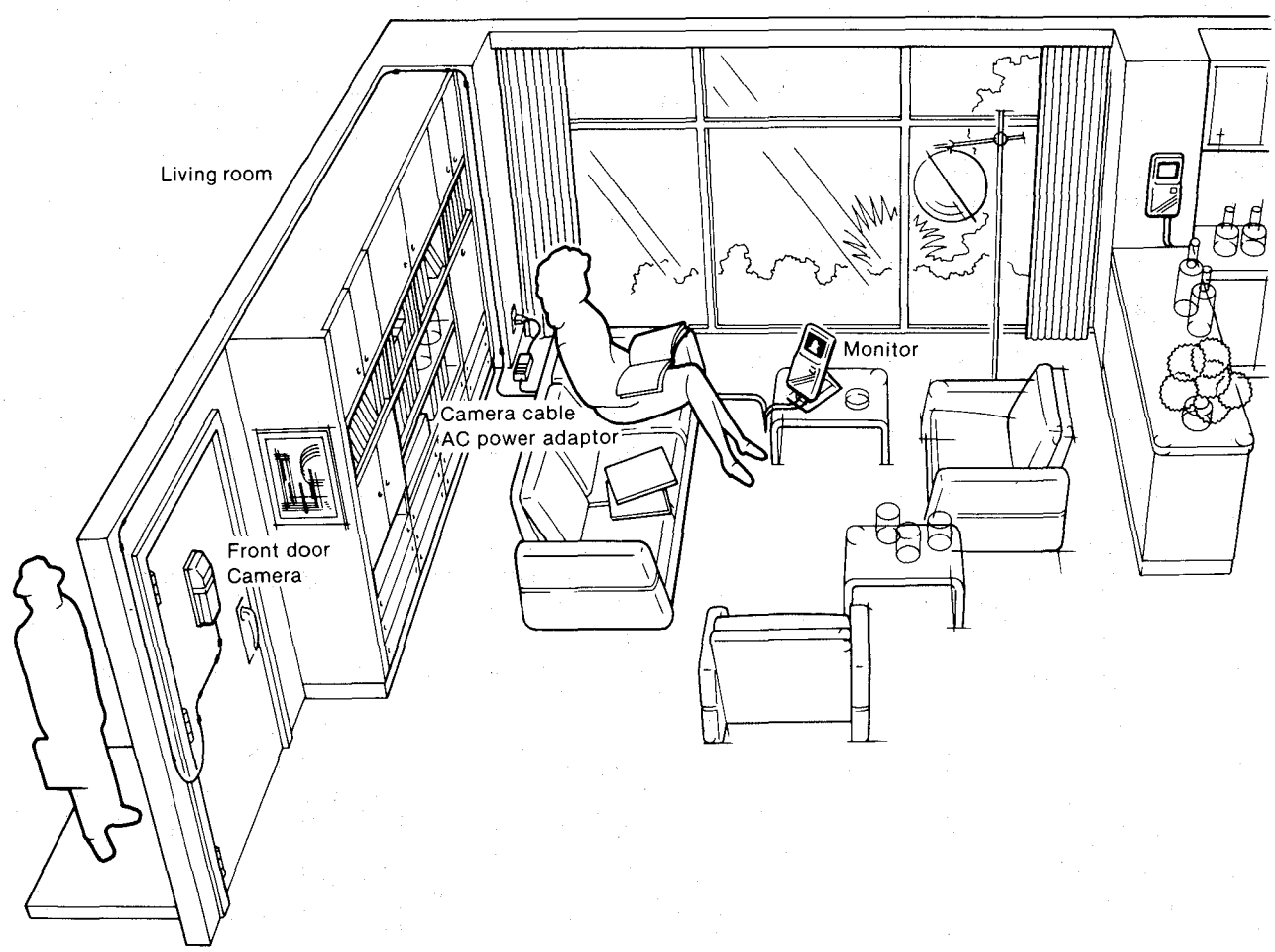
Refer them whenever you call upon Sony service facility.

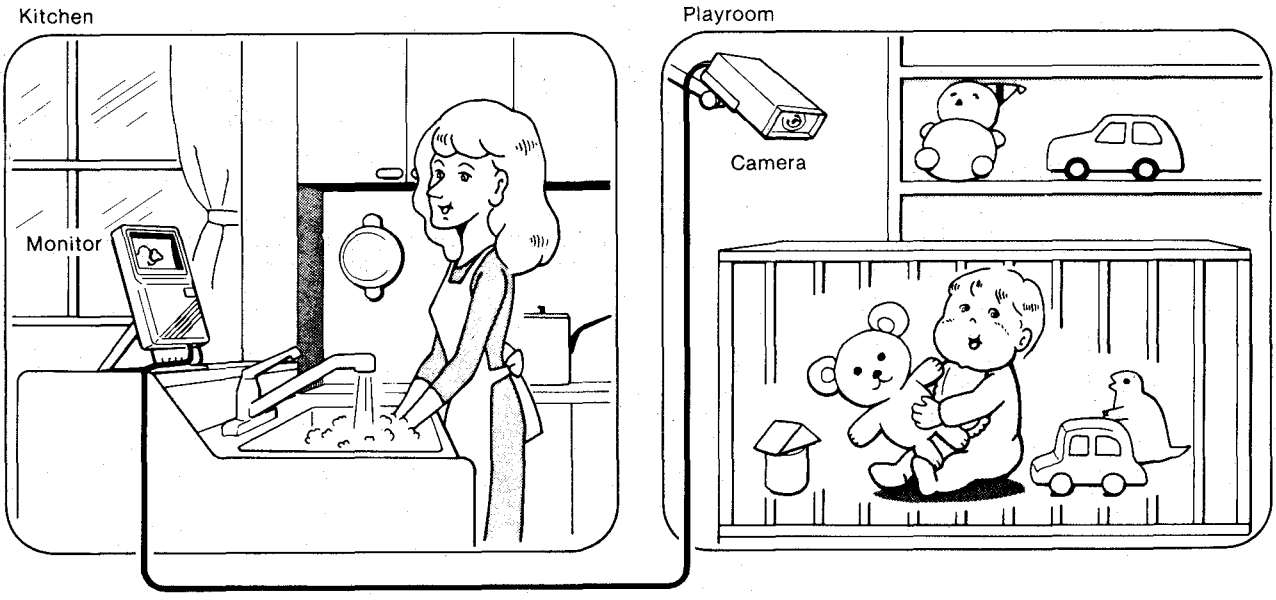
No.	Part	Model number
❶	Stand	
❷	Screws	
❷	L-shape wrench	
❸	Camera holder	
❹	Bracket	
❺	Camera	HVM-304
❻	Camera mount	————
❼	Wall plate	
❽	Monitor	FDM-404A
❾	Screws for wall	
❿	Scale	
⓫	Cable	
⓬	Camera hood	
⓭	AC power adaptor	AC-40E
⓮	Cable clips	
⓯	Spacer	
⓰	Frame	
⓱	Camera mount chassis	



1-3. VERSATILE USE OF THE SYSTEM

FOR SURVEILLANCE





See page 9.

1-4. INSTALLING THE CAMERA UNIT

ON THE DOOR

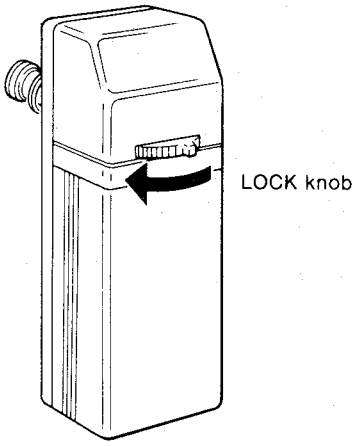
PREPARATIONS

1 Remove the fish-eye lens installed in your front door. Use a countersunk head screwdriver or similar object to remove the lens easily.

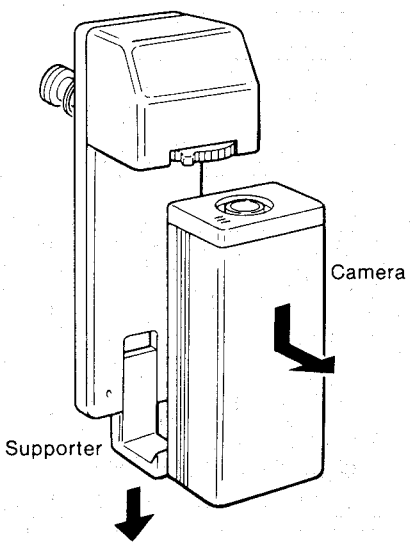
2 Clean the hole to remove any dust or dirt as it might damage the camera mount lens or the fish-eye lens.

> Make sure the hole in the door is large enough for the fish-eye lens of the camera mount. If the hole is too small, use a drill or other tool to enlarge it.

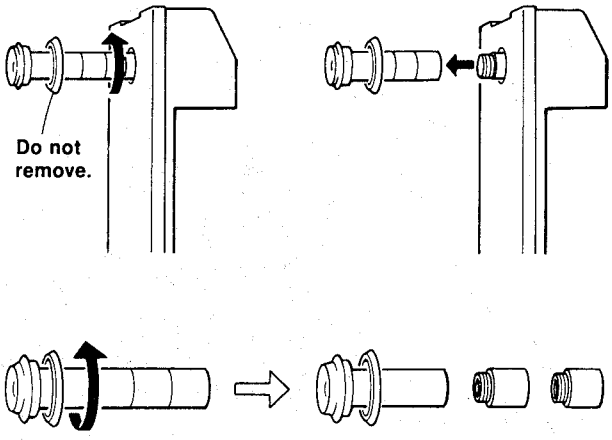
3 Slide the LOCK knob of the camera mount to the left to release the camera.



4 Slide the camera down, and lift it out of the supporter.

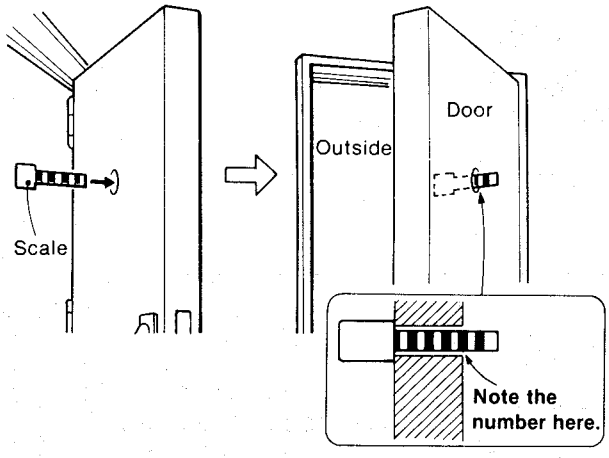


5 Remove the fish-eye lens from the camera mount by turning it counterclockwise.



> **Caution**
> If the lens surface becomes dusty or dirty, picture quality will suffer.

6 Using the supplied scale, measure the thickness of the door.

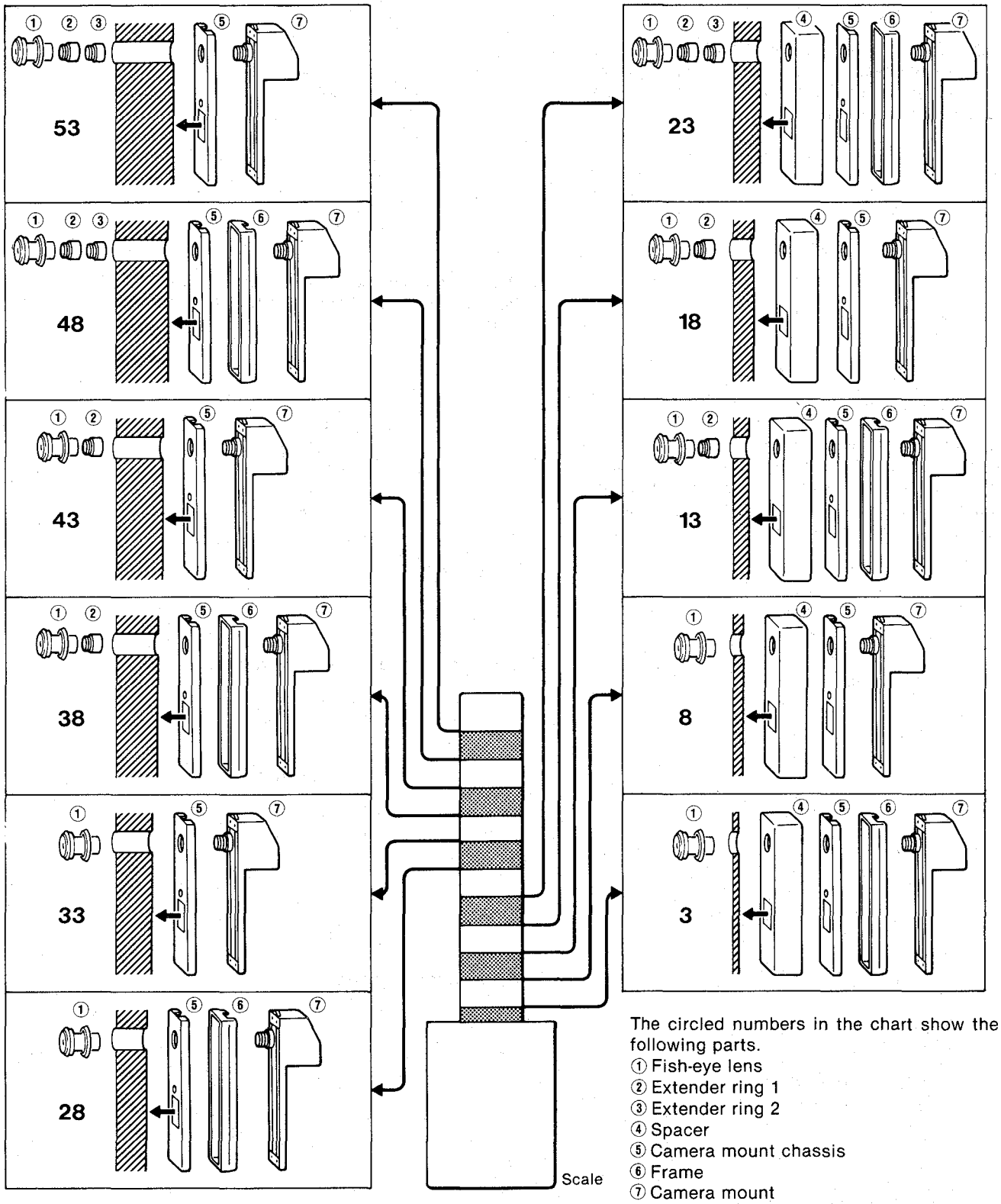


7 Select the parts necessary as indicated in the chart on next page according to the number.

QUICK REFERENCE CHART FOR PARTS TO BE USED

Affix the camera mount chassis to inside of the door first. (For scale numbers 28 to 53)

Affix the spacer to inside of the door first. (For scale numbers 3 to 23)



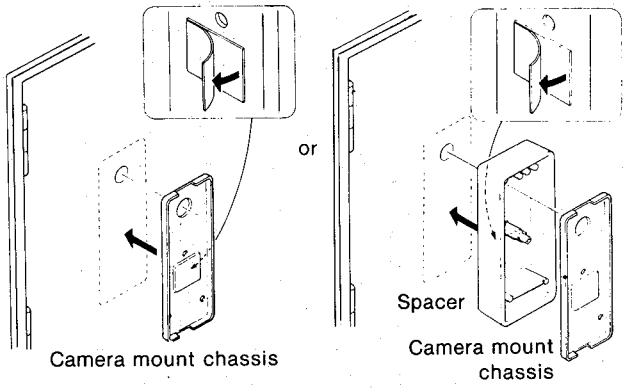
The circled numbers in the chart show the following parts.

① Fish-eye lens
② Extender ring 1
③ Extender ring 2
④ Spacer
⑤ Camera mount chassis
⑥ Frame
⑦ Camera mount

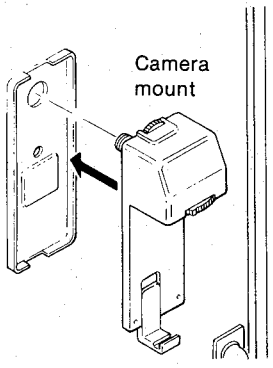
INSTALLATION

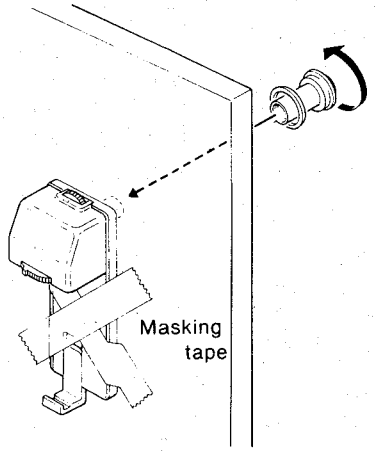
Referring to the quick reference chart for parts to be used on page 7 which matches the thickness of your door, install the unit following these 7 steps.

1 Peel the cover off the adhesive pad and position the camera mount chassis or the spacer on the inside of the door, carefully aligning the door hole and the hole of the chassis or spacer.



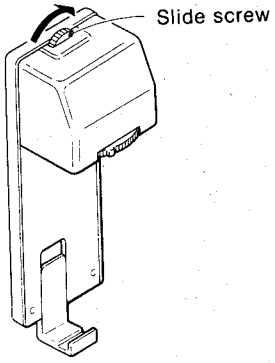
2 Insert the lens projection of the camera mount into the door hole and hold the camera mount in place with masking tape. Insert the frame between the camera mount chassis and the camera mount, if necessary (see the previous page).



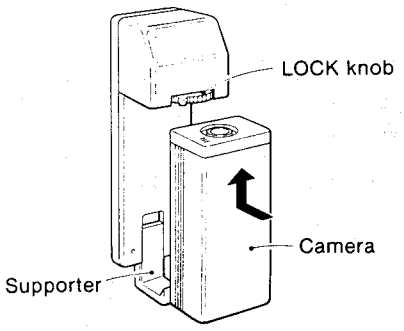


3 Screw the fish-eye lens and the extender ring, if necessary, from the outside of the door onto the lens projection of the camera mount.

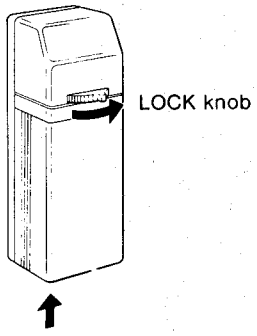
4 To firmly fix the camera mount to the door, turn the slide screw to the right.



5 Replace the camera on the camera mount.
Be sure the LOCK knob is in the released position first.



6 Turn the knob to LOCK to secure the camera.

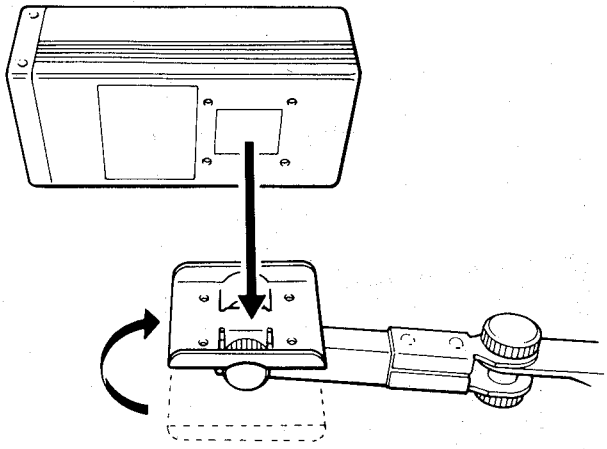


7 Push up the supporter.

IN A ROOM

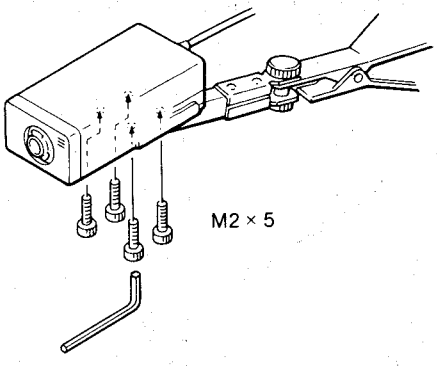
The supplied camera holder allows placement of the camera almost anywhere.

1 Loosen the screw of the holder plate and swing the plate around so that it is on top of the holder. Tighten the screw to hold the plate in place.

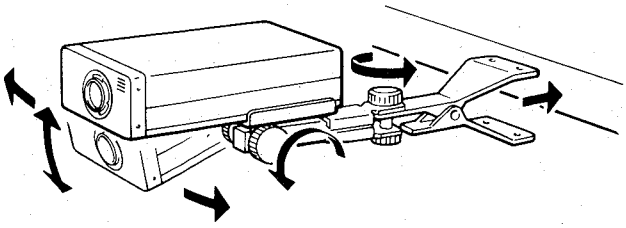


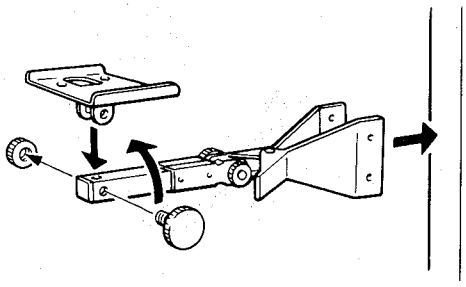
2 Align the 4 holes on the bottom of the camera and on the camera holder.

3 Using the supplied L-shape wrench and screws (in the vinyl bag of the camera holder), secure the camera to the camera holder.



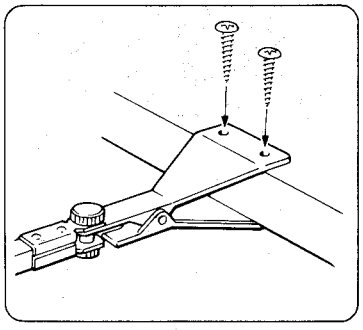
4 Clamp the camera holder at the desired location.

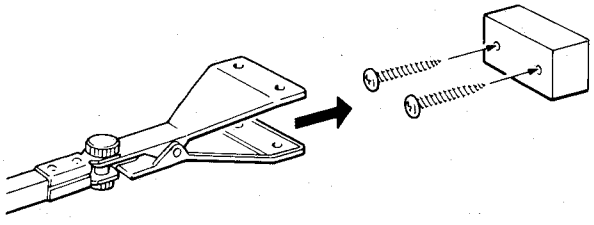




The orientation of the camera holder plate can be easily changed by unscrewing the knobs of the hinges and switching the position of the plate.

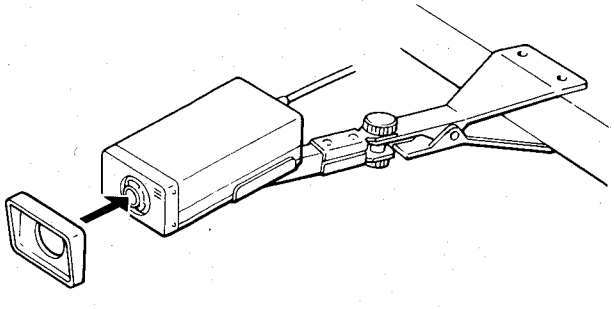
Secure the clamp with the appropriate screws (P4 × 20, not supplied), as illustrated, if necessary.





If there is nothing to clamp the camera holder, install the supplied bracket using the appropriate screws (P4 × 25, not supplied).

5 Attach the camera hood.

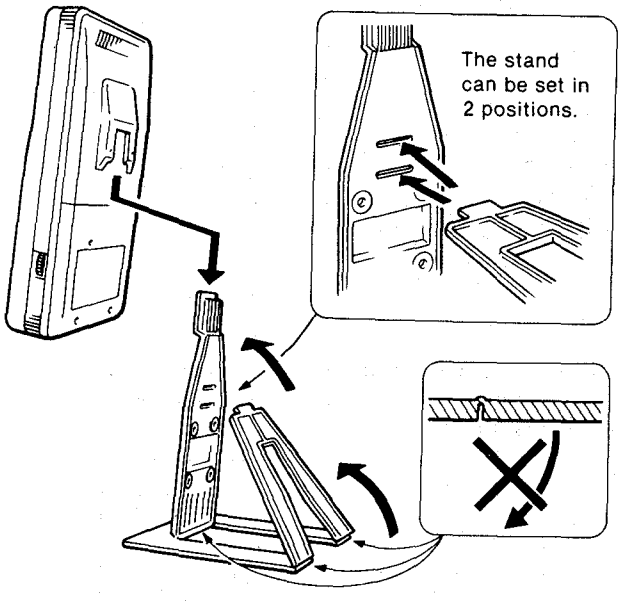


1-5. MONITOR PLACEMENT

ON THE STAND

Caution

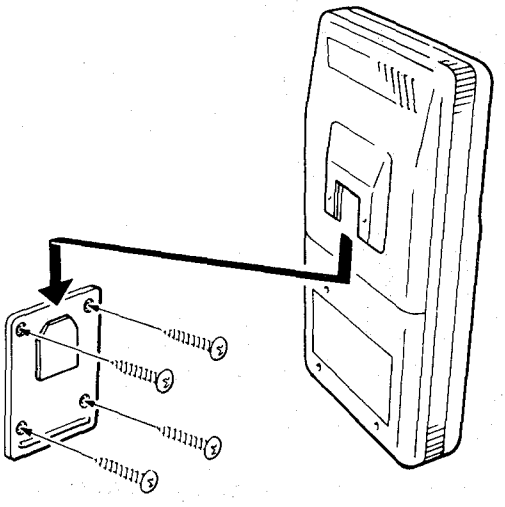
Do not bend the flaps or folded parts forcibly. If you bend them in the wrong direction, the stand may break.



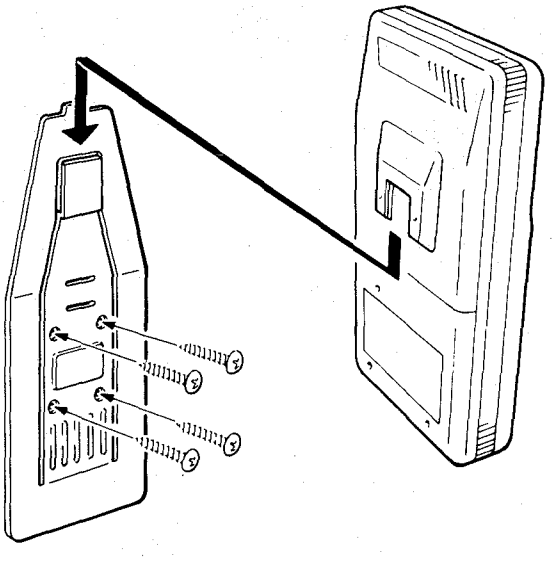
ON THE WALL

Parts and tool required:

ⓐ Wall plate ⓑ Screws in the vinyl bag of the wall plate P4 × 16 ⓒ Phillips head screwdriver (6 mm dia.)



- The stand can also be attached on the wall using the same screws above.
- If the wall is masonry, use suitable masonry screws.

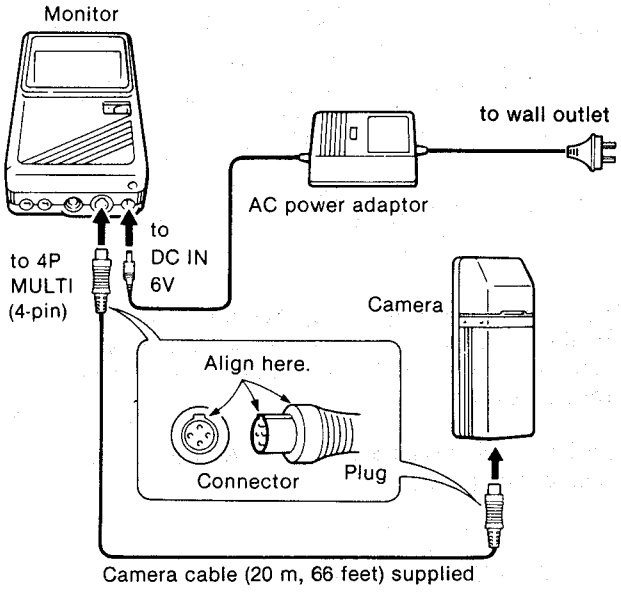


1-6. SYSTEM CONNECTION

CONNECTION DIAGRAM

Notes

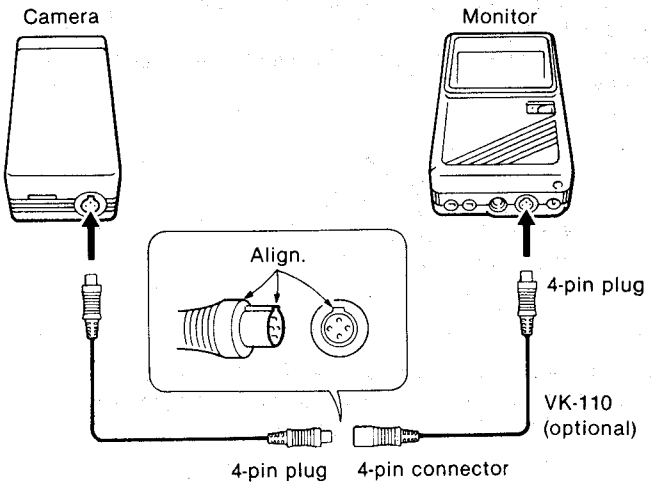
- The plugs should be fully inserted into the connectors or jacks. A loose connection may cause the system to malfunction.
- The connection to the wall outlet should be done last.



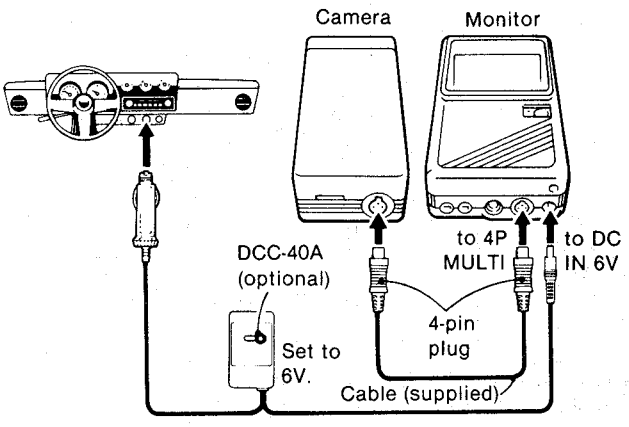
- If the plug of the power cord of the ac power adaptor does not match the wall outlet, use the supplied AC plug adaptor.

Extending the cable

The optional VK-110 camera extension cable (10 m, 33 feet) is used to extend the distance between the black-and-white camera and flat black-and-white monitor. Extendable up to 60 m (198 feet) using four VK-110.



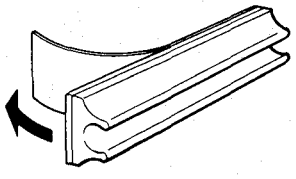
To use with a DCC-40A car battery cord (optional)



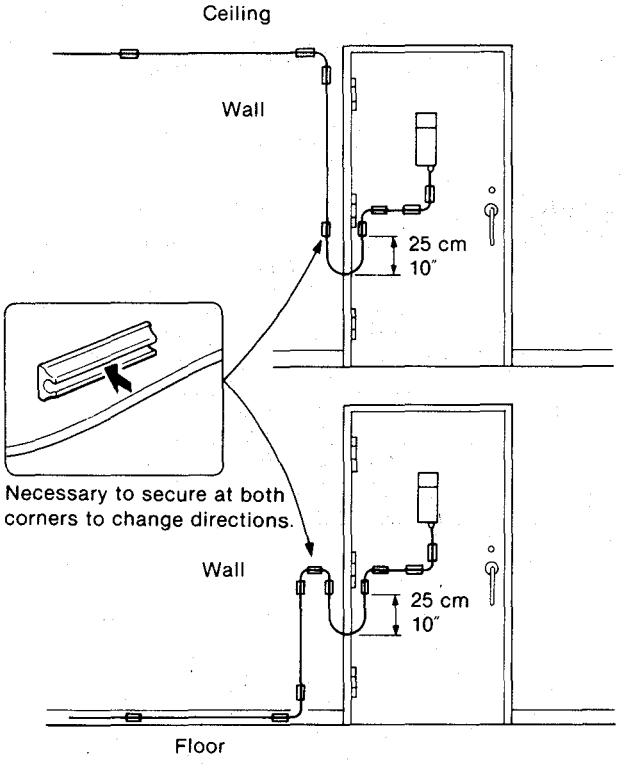
SECURING THE CABLE

Note
The adhesive on the cable clips will only stick to smooth surfaces.

1 Peel the cover off the adhesive backing to affix the supplied cable clips near the door hinges and along the walls or floors.
Position the clips so that the cable will be kept out of the way.

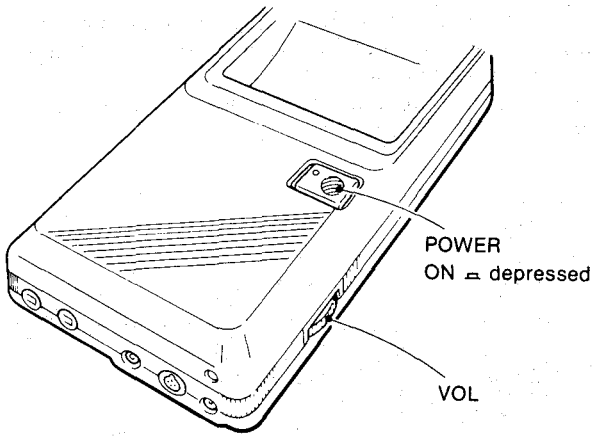


2 Press the cable into the clips. To assure that the door opens smoothly having enough slack in the cable (approx. 25 cm, 10 inches) as illustrated.



1-7. OPERATION

When the door bell rings, **just press the POWER switch of the monitor.**

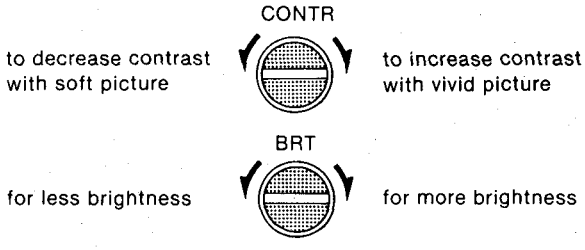


You can easily identify who is at the door by looking at the monitor. Sounds at the door may be heard (depending upon the thickness of the door) by adjusting the VOL control on the monitor.

For continuous surveillance, keep the POWER switch of the monitor depressed.

1-8. PICTURE ADJUSTMENT

at the bottom of the monitor

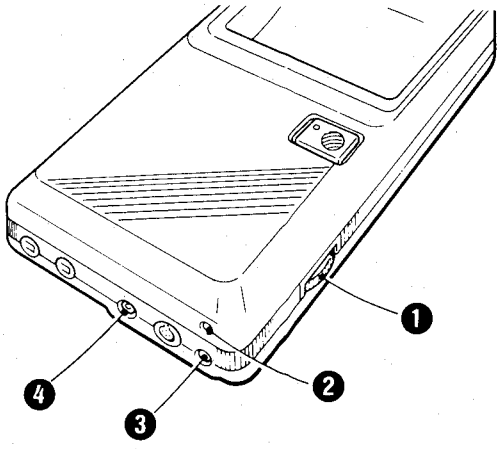


1-9. TROUBLESHOOTING

Disturbances in picture can often be eliminated by checking the symptoms and following the suggestions listed below.

SYMPTOM	CHECK AND ADJUST
The picture does not appear	• Check that the connection between each piece of the system is correct and firm. • Is POWER of the monitor switched on?
Picture reversed between left and right	• Is the supporter of the camera mount set upward?

1-10. OTHER CONTROLS AND JACKS OF THE MONITOR



❶ VOL control
Turn this knob downward to increase the volume of the sound through the monitor speaker or the earphone.
To turn off the sound, turn it upward until it clicks. The sound of the camera microphone is heard.

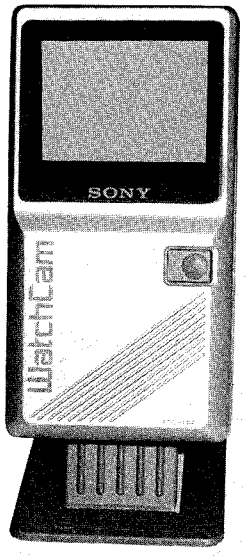
❷ (earphone) jack (minijack)
For listening through an earphone (optional). The sound is monaural even when a mini-type stereo plug of stereo earphone is connected. When an earphone is connected, the speaker is disconnected.

❸ DC IN 6V jack
Accepts the power (DC 6V) through the supplied AC power adaptor or the connected DCC-40A car battery cord (optional).

❹ AV OUT connector (AV uniconnector)
To monitor the same picture and sound on another FDM-404A, connect to the 4P MULTI connector of the other FDM-404A using the optional VK-120A camera cable and VMC-140 plug adaptor.
To record the picture and sound being monitored onto a VCR, or to view the same picture and listen to the same sound on another video monitor, connect to the video input and audio input of that equipment using the optional VMC-612MS audio/video connecting cable.

FDM-404A

SERVICE MANUAL

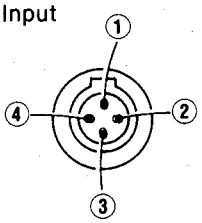


AEP Model

April, 1986

SPECIFICATIONS

FDM–404A flat black-and-white monitor

TV system	**CCIR standards**
Picture tube	Flat black-and-white 4-inch (10 cm) picture measured diagonally
Speaker	Approx. 3.6 cm (1.5 inches) dia.
Audio output	0.05W (7.2 ohms)
Input	 4P MULTI connector: ① 6V DC output, ② Video input, 1.0V p-p, 75 ohms, sync negative, ③ Ground, ④ Audio input: –5 dBs (436 mVrms) more than 30 kilohms
Outputs	Earphone jack (minijack) AV OUT (AV uniconnector) Video output: 1.0V p-p, 75 ohms, sync negative Audio output: –5dBs (436 mVrms), more than 10 kilohms

Power requirements	6 V DC DC IN 6V jack accepts: supplied AC power adaptor for use on 220V AC, 50 Hz or optional DCC-40A car battery cord for use on 12V
Power consumption	Approx. 3.3W
Dimensions	Approx. 110 × 210 × 46 mm (w/h/d) (4 3/8 × 8 3/8 × 1 13/16 inches)
Weight	Approx. 720 g (1 lb 9 oz)

Design and specifications are subject to change without notice.

MICROFILM

FLAT BLACK AND WHITE MONITOR

SONY®

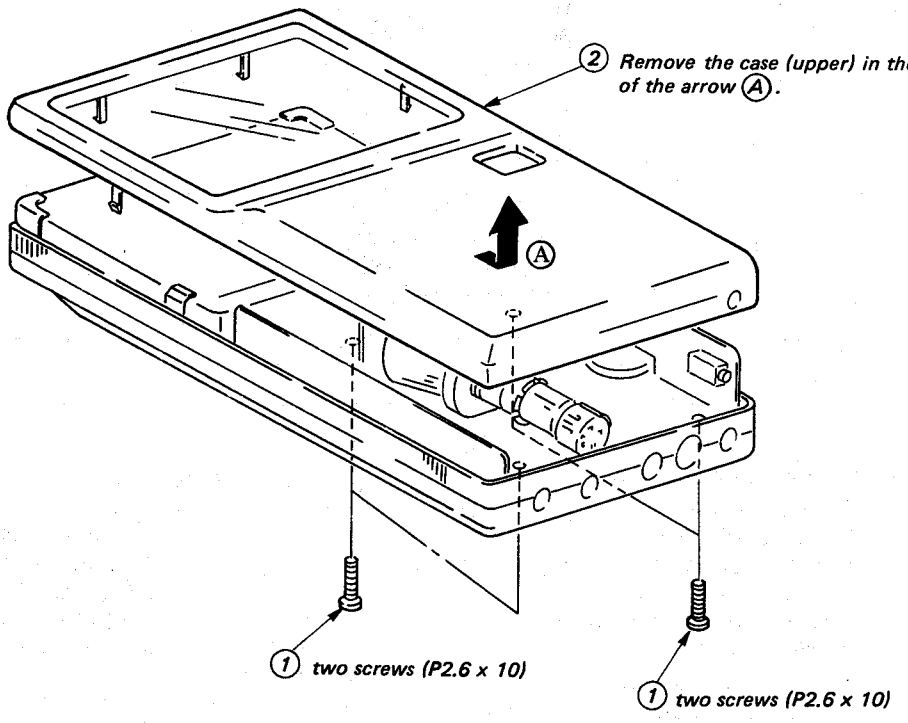
MON

SECTION 1
DISASSEMBLY AND REPLACEMENT

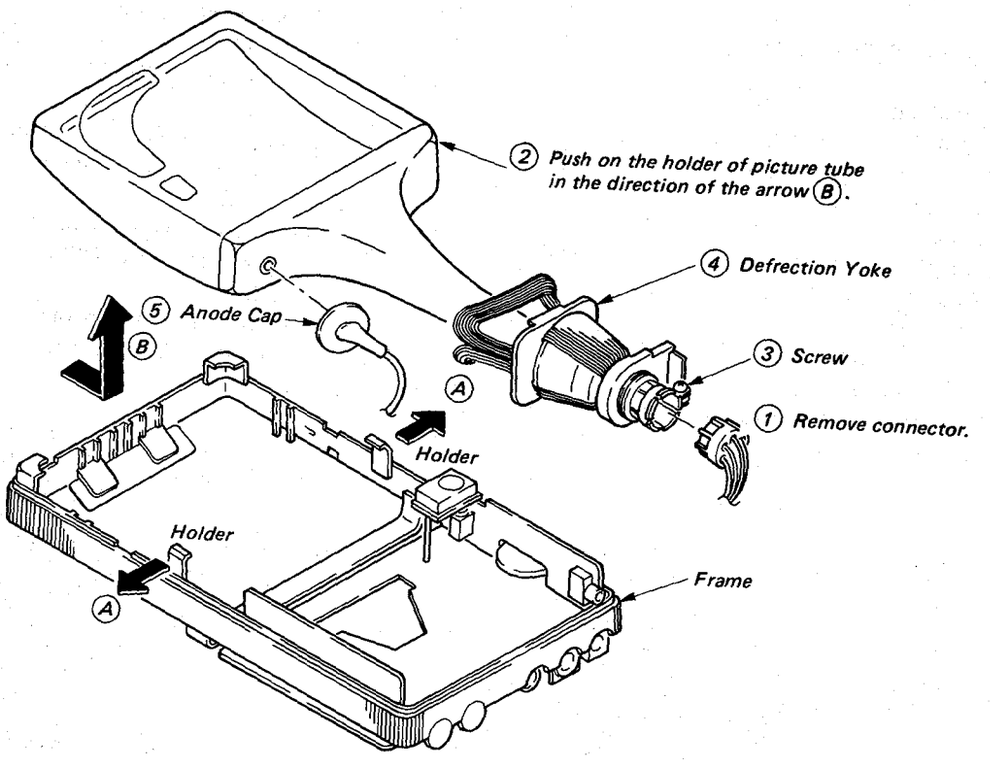
Note: Follow the disassembly procedure in the numerical order given.

1-1. CASE (UPPER) REMOVAL

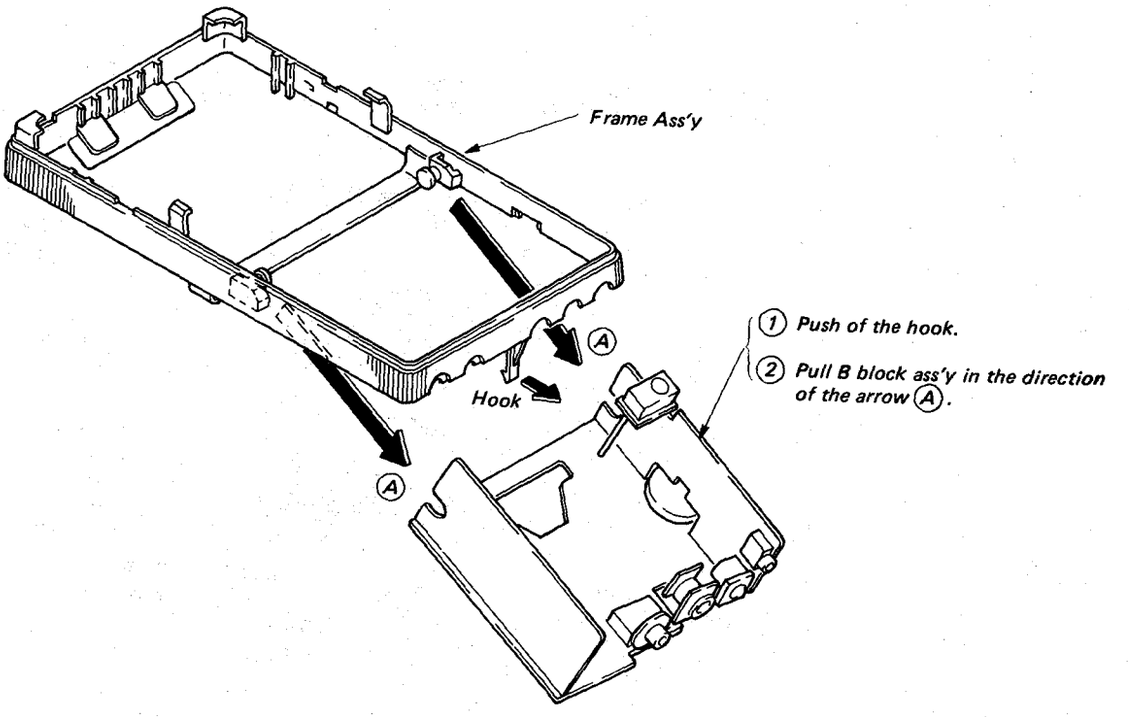
1) Four screws (P2.6 x 10) ①.
2) Remove the case (upper) 2 in the direction of the arrow Ⓐ.



1-2. PICTURE TUBE REMOVAL



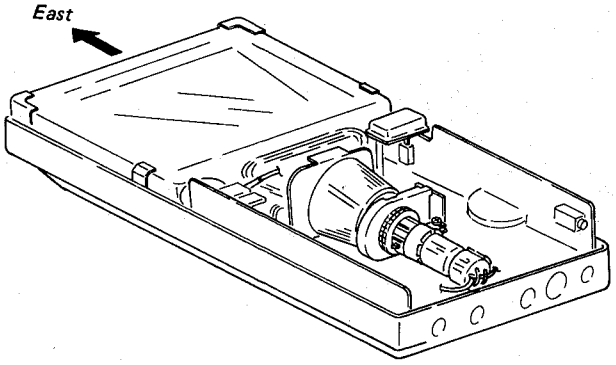
1-3. B BLOCK REMOVAL



SECTION 2
ADJUSTMENTS

2-1. SETUP ADJUSTMENTS

1) Required measuring instruments
   - Digital multimeter
     (Internal impedance: 100MΩ)
   - Color bar/pattern generator
   - DC stabilizing power supply
   - Frequency counter
2) Input signal
   Receive a picture from the camera or a monoscope signal from the video input.
3) Notes in adjustment
   - Unless otherwise specified, the adjustment should be made using a 6V DC input.
   - Adjustment and checking of the screen must be made with the camera level and its top facing east.



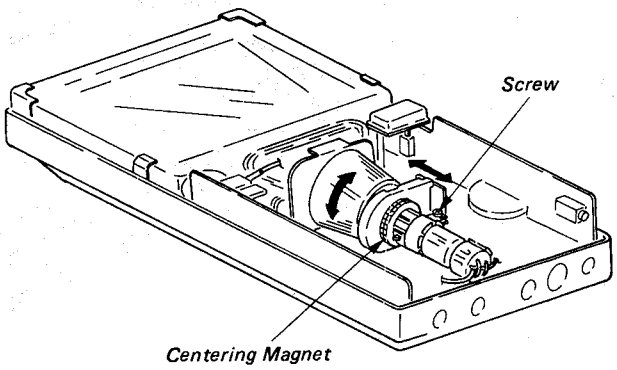
2-2. CIRCUIT ADJUSTMENTS

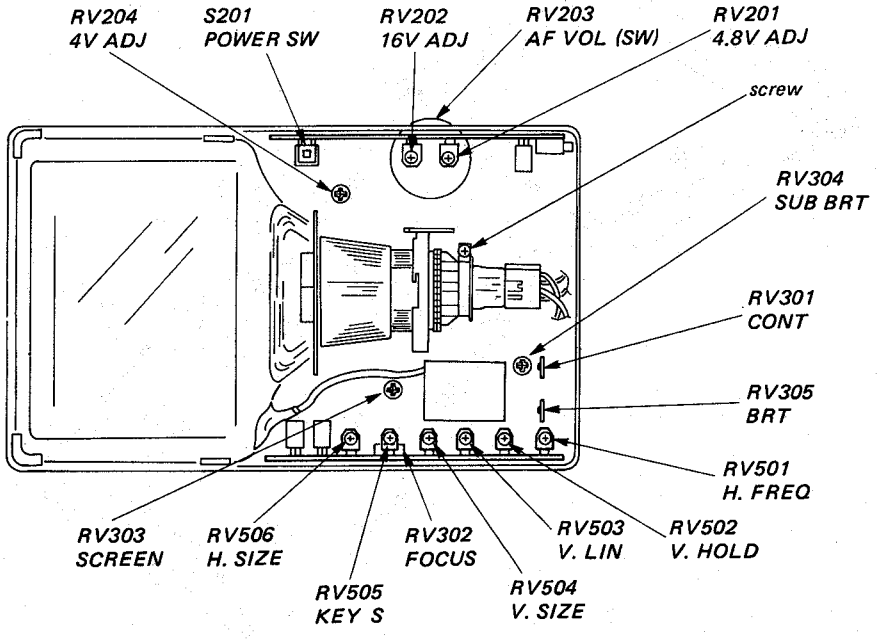
Cetering adjustment

1) Receive a picture from the video input.
2) Turn both CONTRAST AND BRIGHT controls full.
3) Adjust the magnet so that the center of the image is at the screen center.

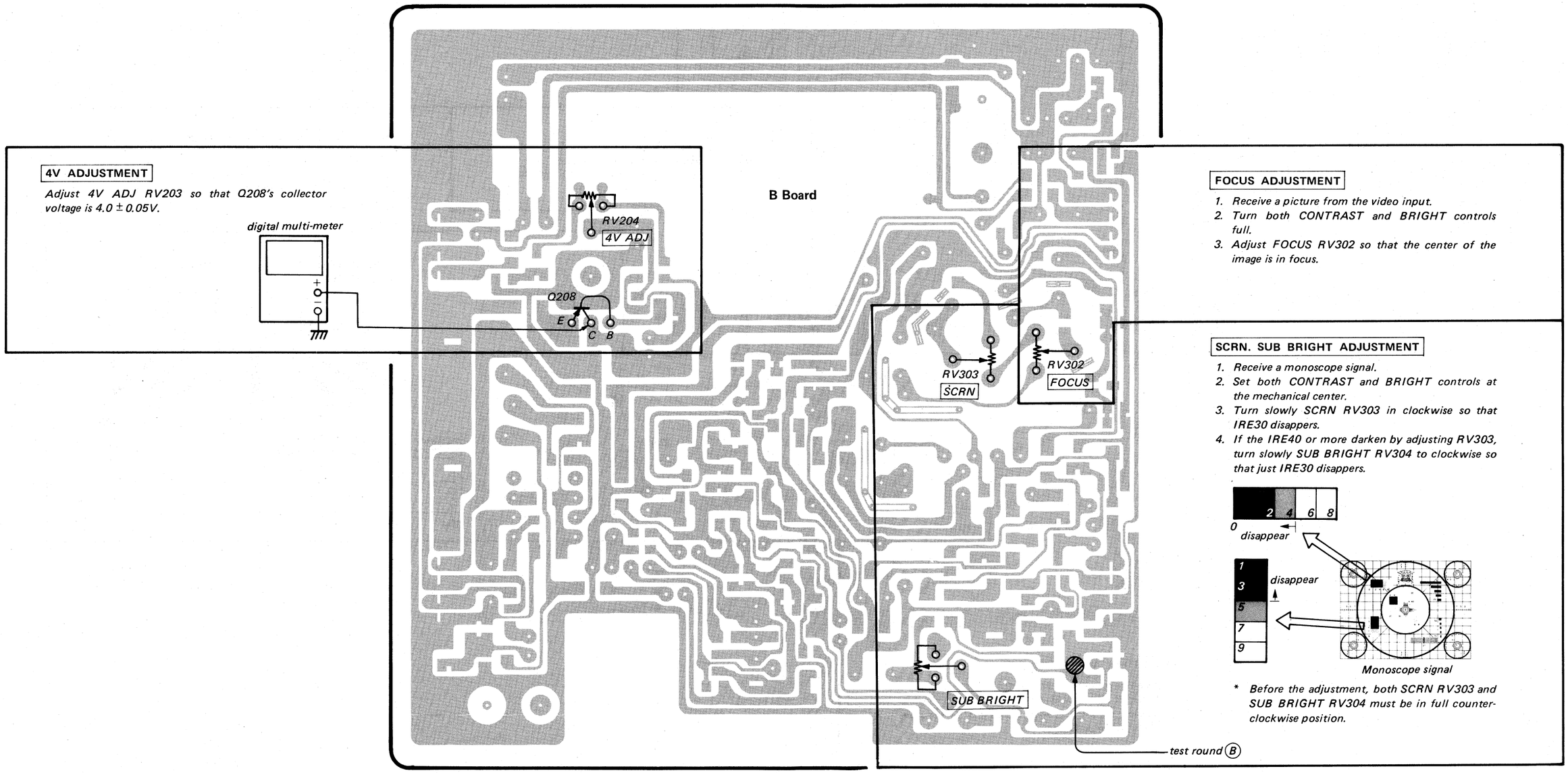
DY adjustment

1) Receive a picture from the video input.
2) Turn both CONTRAST and BRIGHT controls full.
3) Adjust the DY so that the image is not inclined and then fix the DY with the screw.





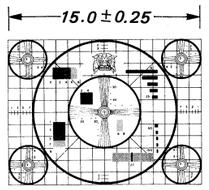
2-2-1. B BOARD ADJUSTMENTS


4V ADJUSTMENT
Adjust 4V ADJ RV203 so that Q208's collector voltage is 4.0 ± 0.05V.
digital multi-meter
+
−
RV204
4V ADJ
Q208
E
C
B
B Board
RV303
SCRN
RV302
FOCUS
SUB BRIGHT
test round (B)
FOCUS ADJUSTMENT
1. Receive a picture from the video input.
2. Turn both CONTRAST and BRIGHT controls full.
3. Adjust FOCUS RV302 so that the center of the image is in focus.
SCRN. SUB BRIGHT ADJUSTMENT
1. Receive a monoscope signal.
2. Set both CONTRAST and BRIGHT controls at the mechanical center.
3. Turn slowly SCRN RV303 in clockwise so that IRE30 disappers.
4. If the IRE40 or more darken by adjusting RV303, turn slowly SUB BRIGHT RV304 to clockwise so that just IRE30 disappers.
2 4 6 8
0
disappear
1
3
5
7
9
disappear
Monoscope signal
* Before the adjustment, both SCRN RV303 and SUB BRIGHT RV304 must be in full counter-clockwise position.

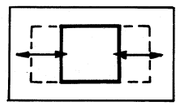
2-2-2. D BOARD ADJUSTMENTS

H SIZE ADJUSTMENT

1. *Receive a picture from the video input.*
2. *Adjust the horizontal amplitude with H SIZE RV506.*
   * *If a monoscope signal is used, the horizontal amplitude must be adjusted to 15.0 ± 0.25 columns.*

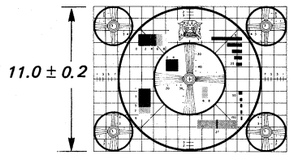


Monoscope signal

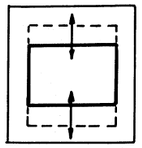


V SIZE ADJUSTMENT

1. *Receive a picture from the video input.*
2. *Adjust the vertical amplitude with V SIZE RV504.*
   * *Monoscope signal: 11.0 ± 0.2 columns*



Monoscope signal



V LINE ADJUSTMENT

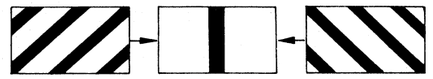
1. *Receive a picture from the video input.*
2. *Adjust the vertical linearity with V LINE RV503.*

VERTICAL SYNCHRONIZING SIGNAL ADJUSTMENT

1. *Receive a picture from the video input.*
2. *Adjust V HOLD RV502 so that the picture stops moving vertically.*

HORIZONTAL OSCILLATION FREQUENCY ADJUSTMENT

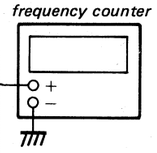
1. *Strap IC501's pins (9) and (18) with a jumper.*
2. *Adjust H FREQ RV501 so that the screen is as shown below.*

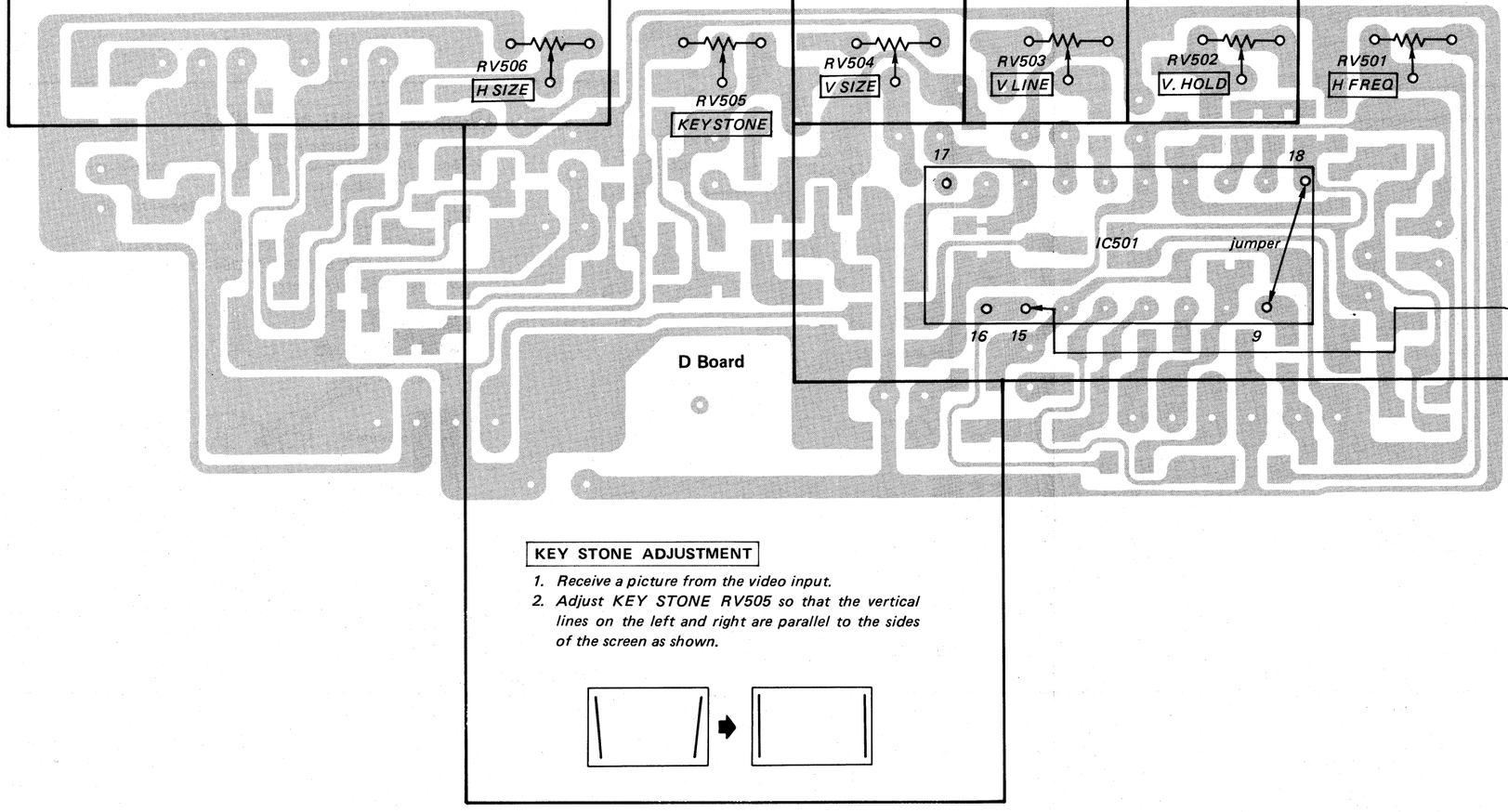


fo: too high *fo: suitable* *fo: too low*

fo = 15.734 ± 0.1kHz at IC501's pin (15) (Measurement point)

3. *Remove the jumper.*

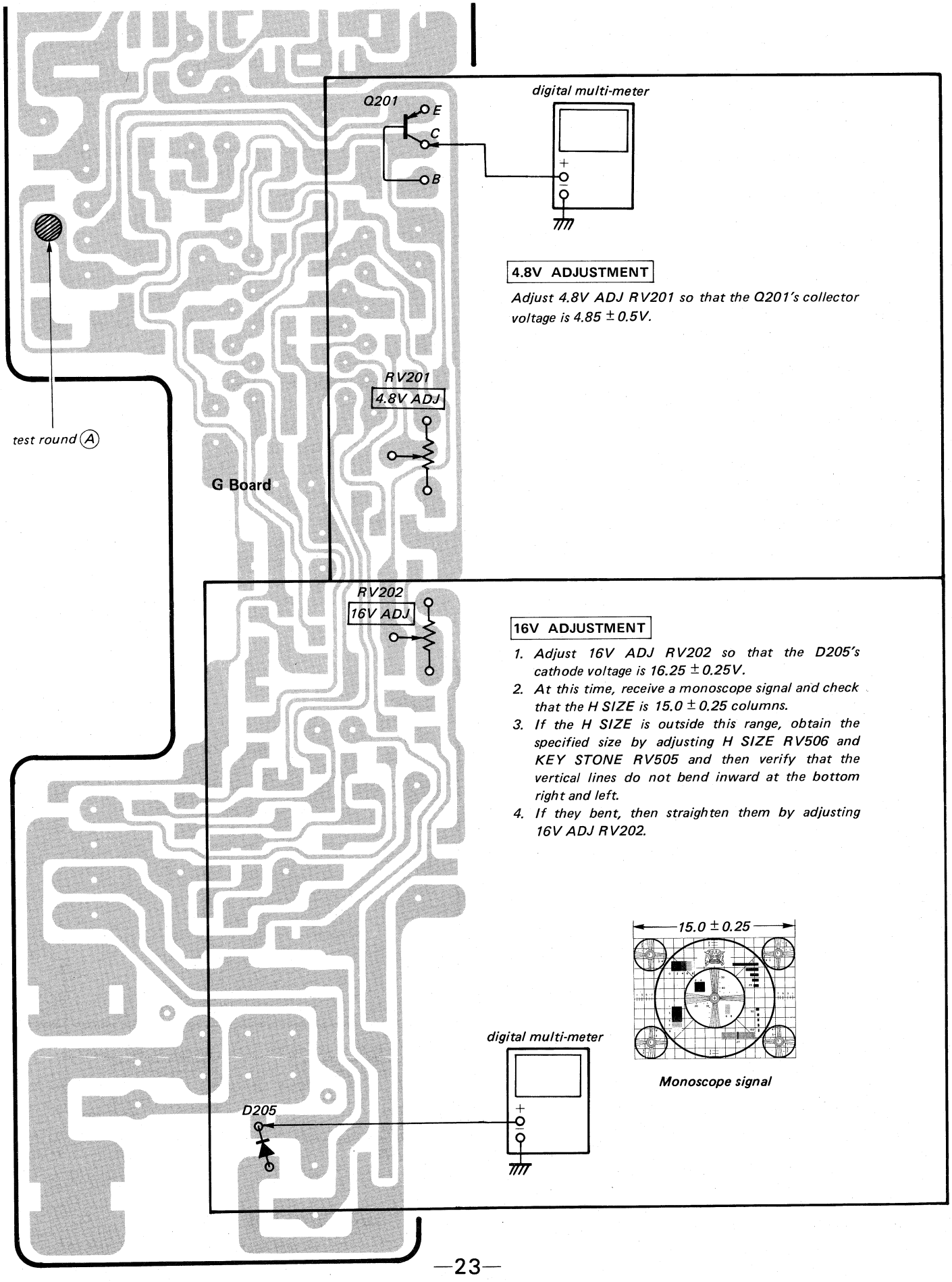




KEY STONE ADJUSTMENT

1. *Receive a picture from the video input.*
2. *Adjust KEY STONE RV505 so that the vertical lines on the left and right are parallel to the sides of the screen as shown.*

2-2-3. G BOARD ADJUSTMENTS



4.8V ADJUSTMENT

Adjust 4.8V ADJ RV201 so that the Q201's collector voltage is 4.85 ± 0.5V.

16V ADJUSTMENT

1. *Adjust 16V ADJ RV202 so that the D205's cathode voltage is 16.25 ± 0.25V.*
2. *At this time, receive a monoscope signal and check that the H SIZE is 15.0 ± 0.25 columns.*
3. *If the H SIZE is outside this range, obtain the specified size by adjusting H SIZE RV506 and KEY STONE RV505 and then verify that the vertical lines do not bend inward at the bottom right and left.*
4. *If they bent, then straighten them by adjusting 16V ADJ RV202.*

Monoscope signal

2-2-4. HOLD DOWN CIRCUIT ADJUSTMENTS

HOLD DOWN CIRCUIT ADJUSTMENT AND CHECK

1) D208 HOLD DOWN CIRCUIT CHECK

When D208, R237, R238 and/or Q203 are replaced, make the following check:

Confirm that when a 9.45 ±0.05V DC is externally applied to DC IN the HOLD DOWN CIRCUIT operates and the raster disappears.

Condition: Signal . . . . . .Monoscope signal
BRIGHT . . . .At the mechanical center
CONTRAST. .At the mechanica center

2) D201 HOLD DOWN CIRCUIT CHECK

When D201, R210, R211 and/or IC201 are replaced, perform the following checks:

(1) Unsolder test round (A) to open the circuit and externally apply a 5.80 ±0.05V DC to the R210 side of the test round and then check that HOLD DOWN CIRCUIT operates and raster disappears.

Condition: Signal . . . . . .Monoscope signal
BRIGHT . . . .At the mechanical center
CONTRAST. .At the mechanical center
Input . . . . . .6.0V DC

(2) Resolder the test round (A) to close the circuit.

(3) Using a tester check that the Q201 collector and R210 +B (5V) side round are conducting.

3) D303 HOLD DOWN CIRCUIT CHECK

When D303 and/or R315 are replaced, make the following check:

(1) Unsolder test round (B) to open the circuit and externally apply a 7.20 ± 0.1V DC to the D303's cathode of the test round and then check that HOLD DOWN CIRCUIT operates and the raster disappears.

Condition: Signal . . . . . .Monoscope signal
BRIGHT . . . .At the mechanical center
CONTRAST. .At the mechanical center
Input . . .6.0V DC

(2) Resolder the test round (B) to close the circuit.

(3) Using a tester check that the connector CN202's pin (1) and D303's cathode side round are conducting.

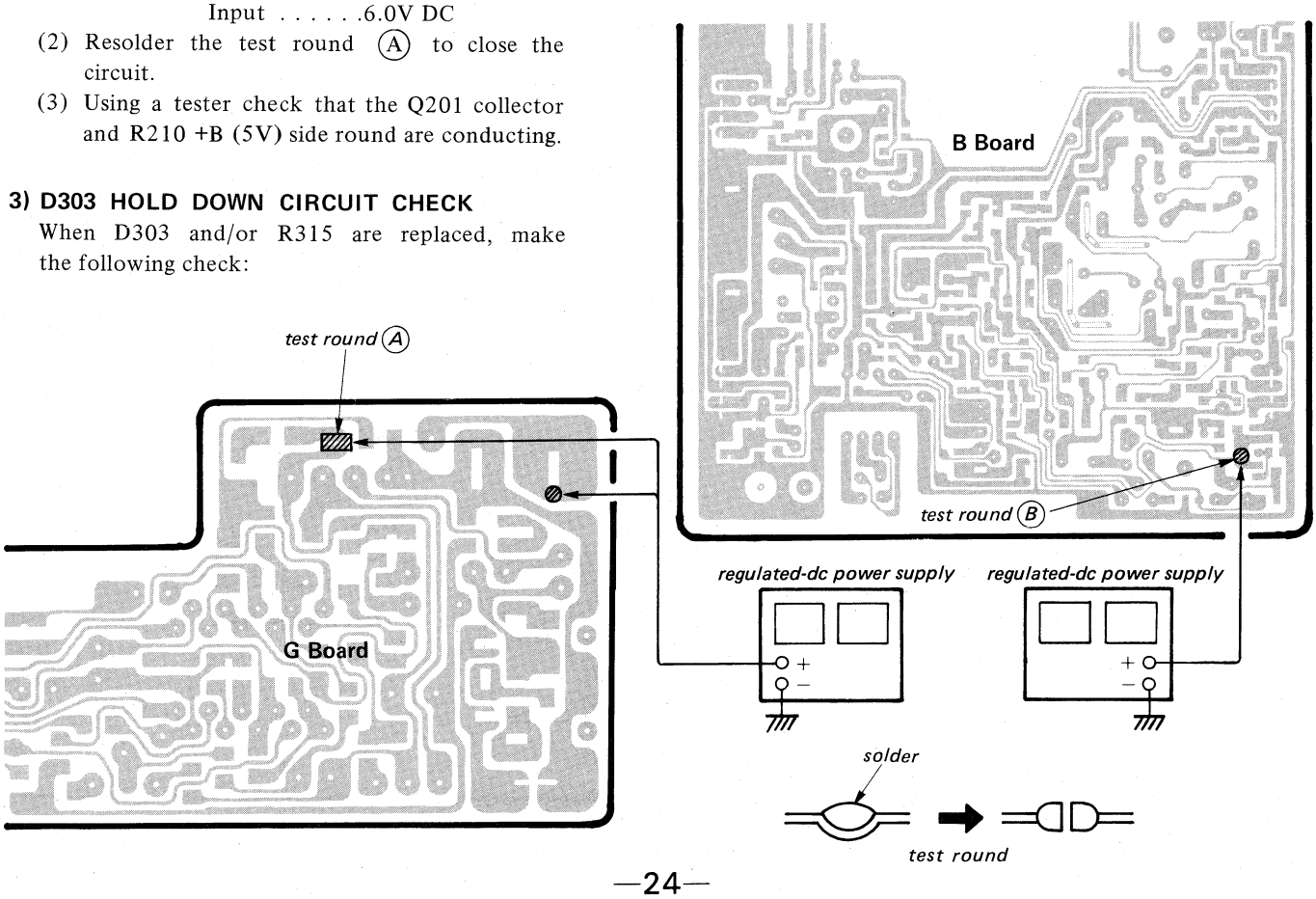
4) +B MAXIMUM VALUE CHECK

When R203, R204, RV201, and/or IC201 are replaced, perform the following check:

Test voltage: 6.6V DC

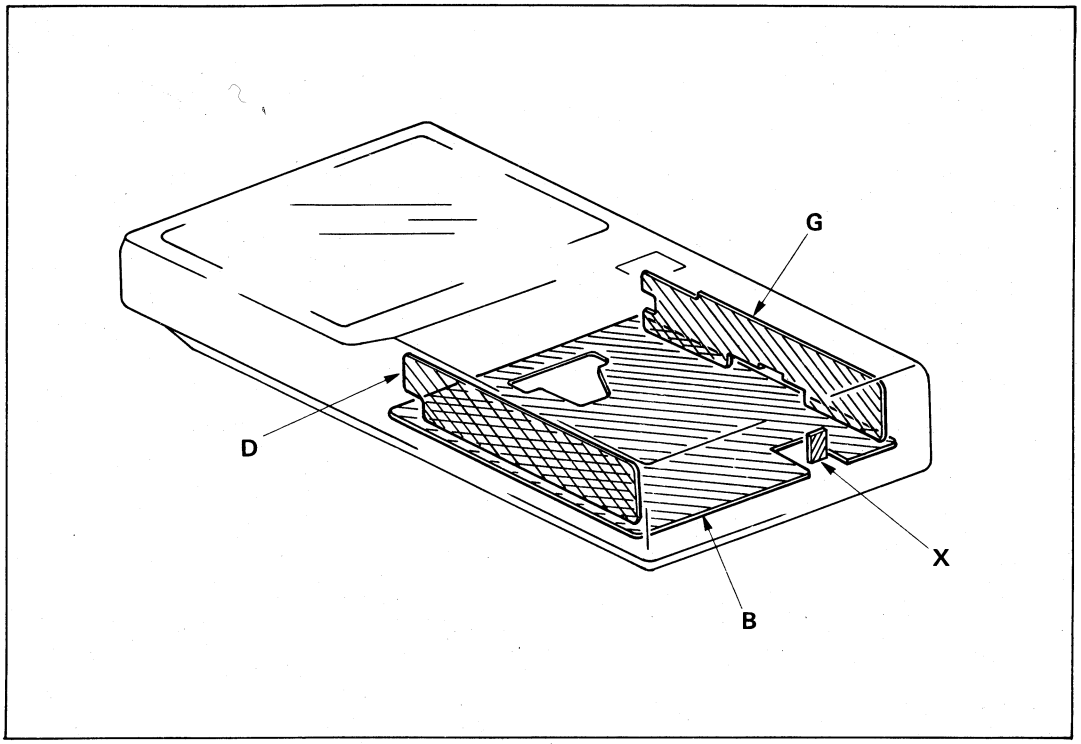
Set RV201 at its maximum when a 6.6 $^{+0.3}_{-0}$V DC is input and check that a +B (4.85V) output voltage is 5.7V or less.

Condition. Signal . . . . . .Monoscope signal
BRIGHT . . . .At the mechanical center
CONTRAST. .At the mechanical center



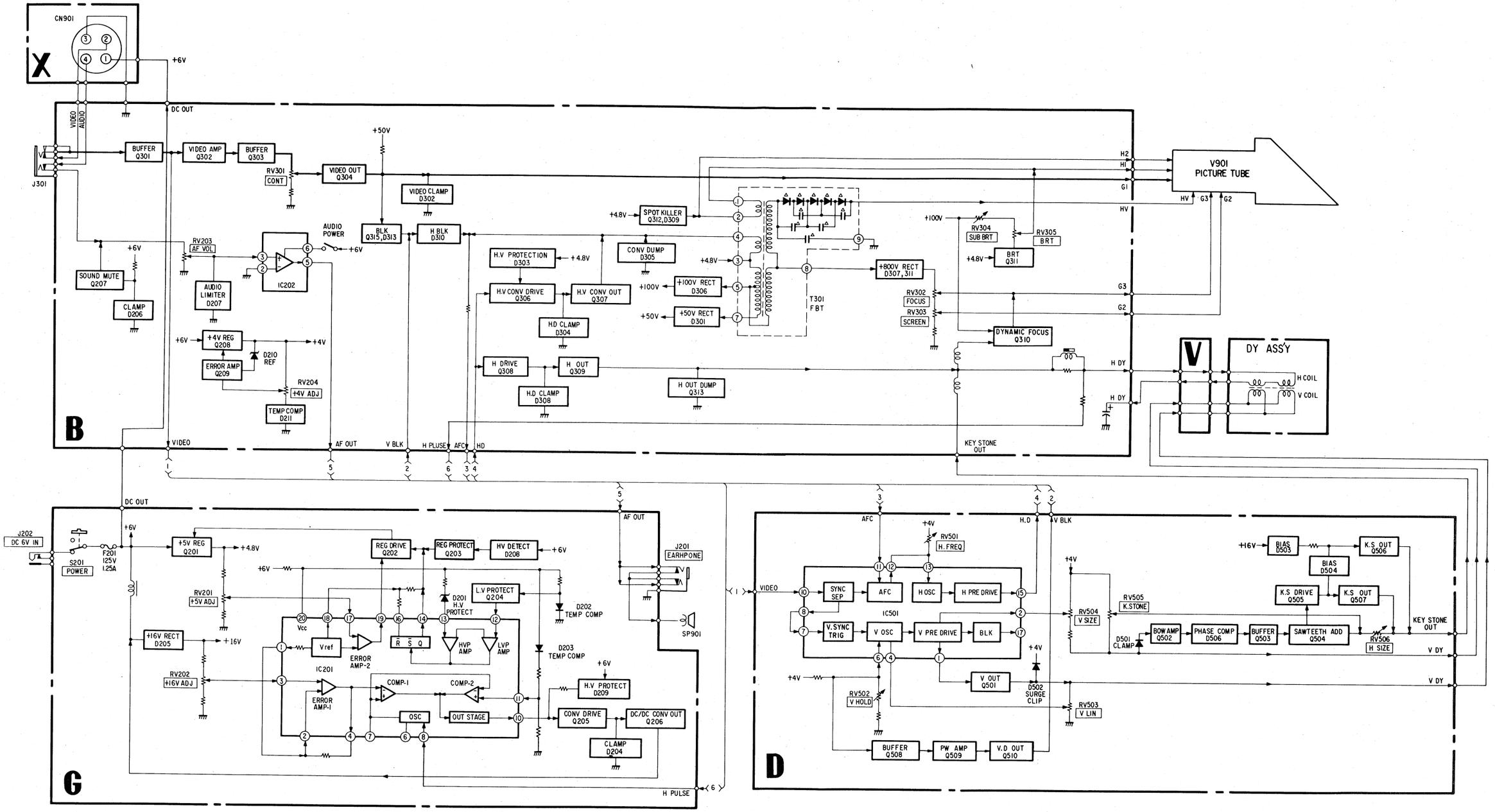
SECTION 3
DIAGRAMS

3-1. CIRCUIT BOARDS LOCATION



HNS-16A FDM-404A HVM-304

3-2. BLOCK DIAGRAM



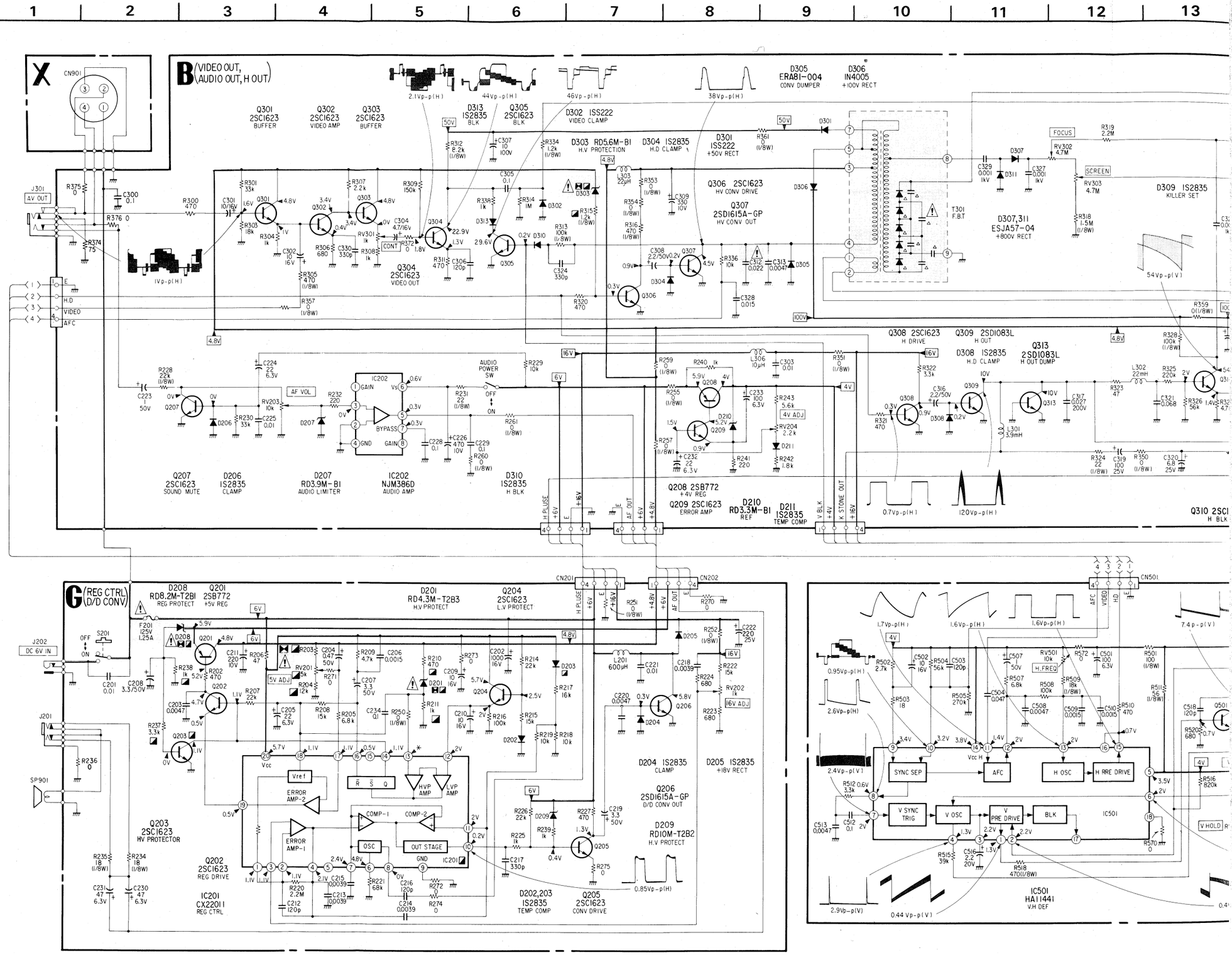
HNS-16A FDM-404A HVM-304 HNS-16A FD HV

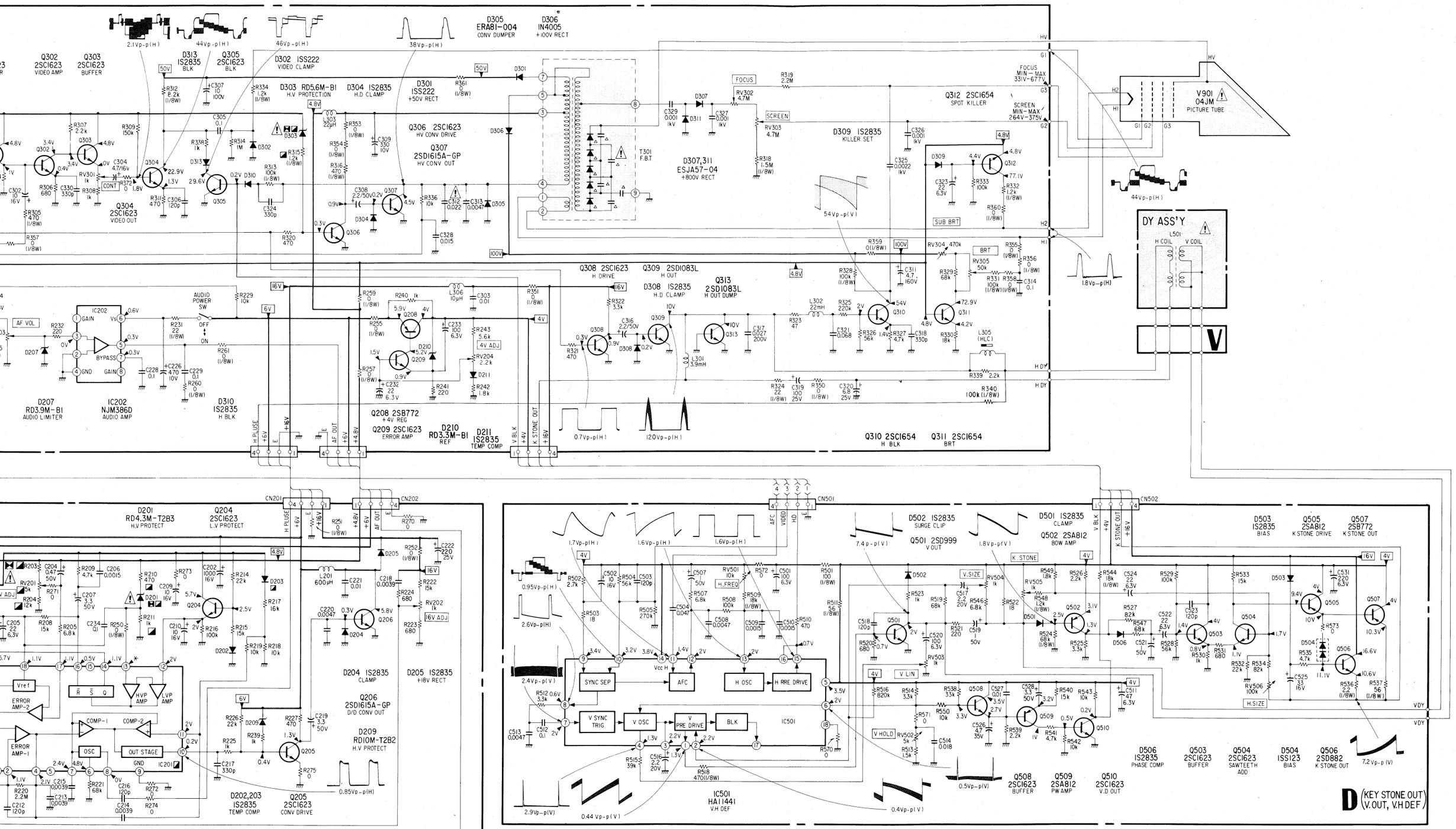
3-3. SCHEMATIC DIAGRAM

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Note:

- All capacitors are in μF unless otherwise noted. pF : μμF 50WV or less are not indicated except for electrolytics.
- All resistors are in ohms, 1/10W unless otherwise noted. kΩ : 1000Ω, MΩ : 1000kΩ
- ▭ : nonflammable resistor.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- △ : internal component.
- ▭ : panel designation.
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken with a 10MΩ digital multimeter.
- ▭ : adjustment for repair.
- Voltage variations may be noted due to normal production tolerances.
- V : B+ bus.
- Readinge are taken with a color-bar signal input.



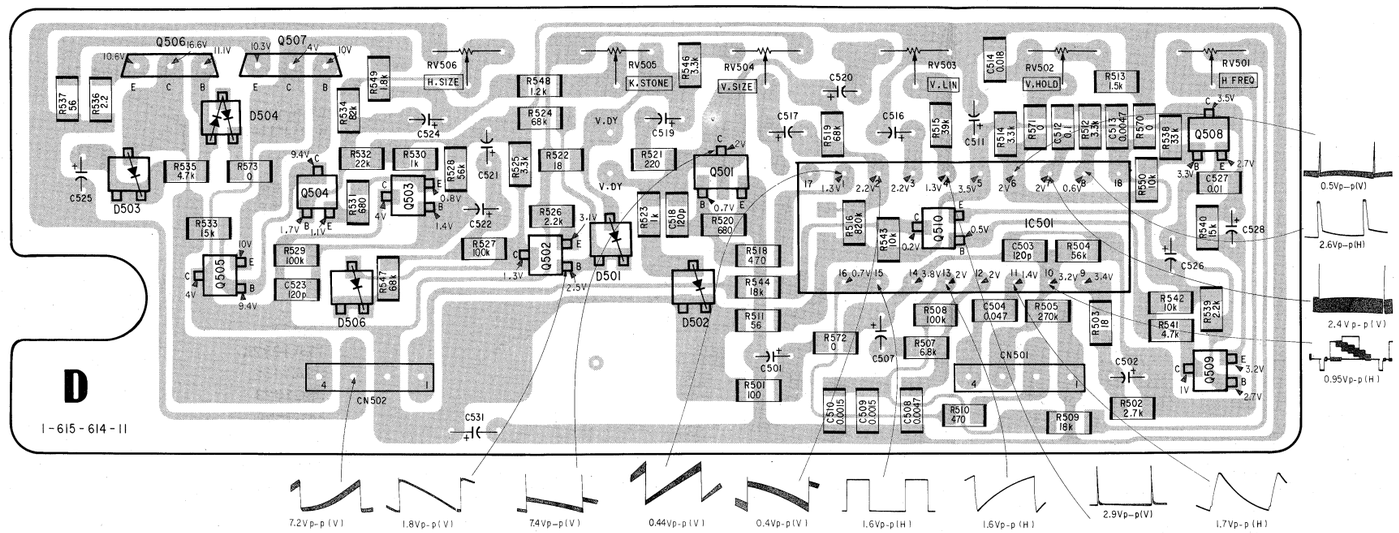

Q302 2SC1623 VIDEO AMP
Q303 2SC1623 BUFFER
D313 IS2835 BLK
Q305 2SC1623 BLK
D302 ISS222 VIDEO CLAMP
D303 RD5.6M-BI H.V PROTECTION
D304 IS2835 H.D CLAMP
D301 ISS222 +50V RECT
D305 ERA81-004 CONV DUMPER
D306 IN4005 +100V RECT
Q306 2SC1623 HV CONV DRIVE
Q307 2SD1615A-GP HV CONV OUT
T301 F.B.T
D307,311 ESJA57-04 +800V RECT
Q312 2SC1654 SPOT KILLER
D309 IS2835 KILLER SET
V901 04JM PICTURE TUBE
FOCUS MIN-MAX 331V-677V
SCREEN MIN-MAX 264V-375V
DY ASS'Y
L501 H COIL V COIL
Q304 2SC1623 VIDEO OUT
Q308 2SC1623 H DRIVE
Q309 2SD1083L H OUT
D308 IS2835 H.D CLAMP
Q313 2SD1083L H OUT DUMP
Q310 2SC1654 H BLK
Q311 2SC1654 BRT
IC202 NJM386D AUDIO AMP
D207 RD3.9M-BI AUDIO LIMITER
D310 IS2835 H BLK
Q208 2SB772 +4V REG
Q209 2SC1623 ERROR AMP
D210 RD3.3M-BI REF
D211 IS2835 TEMP COMP
D201 RD4.3M-T2B3 H.V PROTECT
Q204 2SC1623 L.V PROTECT
D204 IS2835 CLAMP
D205 IS2835 +18V RECT
Q206 2SD1615A-GP D/D CONV OUT
D209 RD10M-T2B2 H.V PROTECT
D202,203 IS2835 TEMP COMP
Q205 2SC1623 CONV DRIVE
IC201
Q501 2SD999 V OUT
D502 IS2835 SURGE CLIP
D501 IS2835 CLAMP
Q502 2SA812 BOW AMP
D503 IS2835 BIAS
Q505 2SA812 K STONE DRIVE
Q507 2SB772 K STONE OUT
D506 IS2835 PHASE COMP
Q503 2SC1623 BUFFER
Q504 2SC1623 SAWTEETH ADD
D504 ISS123 BIAS
Q506 2SD882 K STONE OUT
Q508 2SC1623 BUFFER
Q509 2SA812 PW AMP
Q510 2SC1623 V.D OUT
IC501 HA11441 V.H DEF
D (KEY STONE OUT \ V. OUT, V.H DEF /

3-4. PRINTED WIRING BOARDS
– Conductor Side –

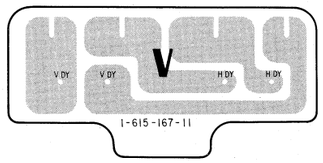
[KEY STONE OUT V. OUT. V.H DEF] **D** [REG CTRL, D/D CONV] **G** **D** **G** **V**

– D Board –

IC,Q	506 505	507 504	503	502	501	510 IC501	508 509	IC,Q
D	503 504	506	501	502				D
ADJ	RV506		RV505		RV504	RV503	RV502	RV501 ADJ



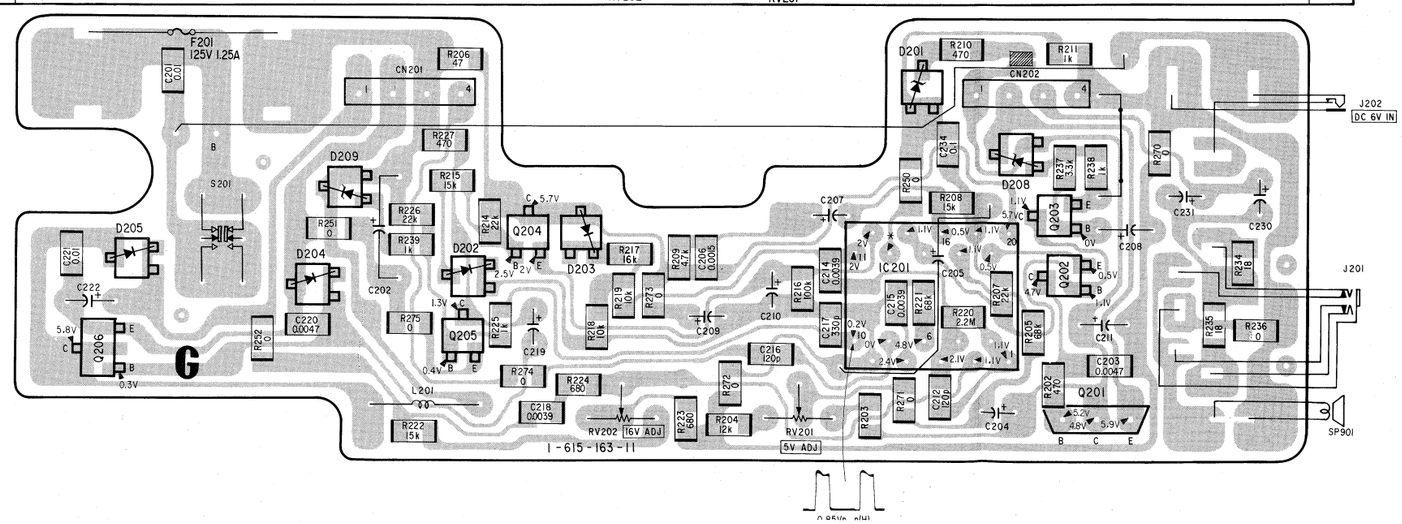
– V Board –



0.5Vp-p(V)
2.6Vp-p(H)
2.4Vp-p(V)
0.95Vp-p(H)

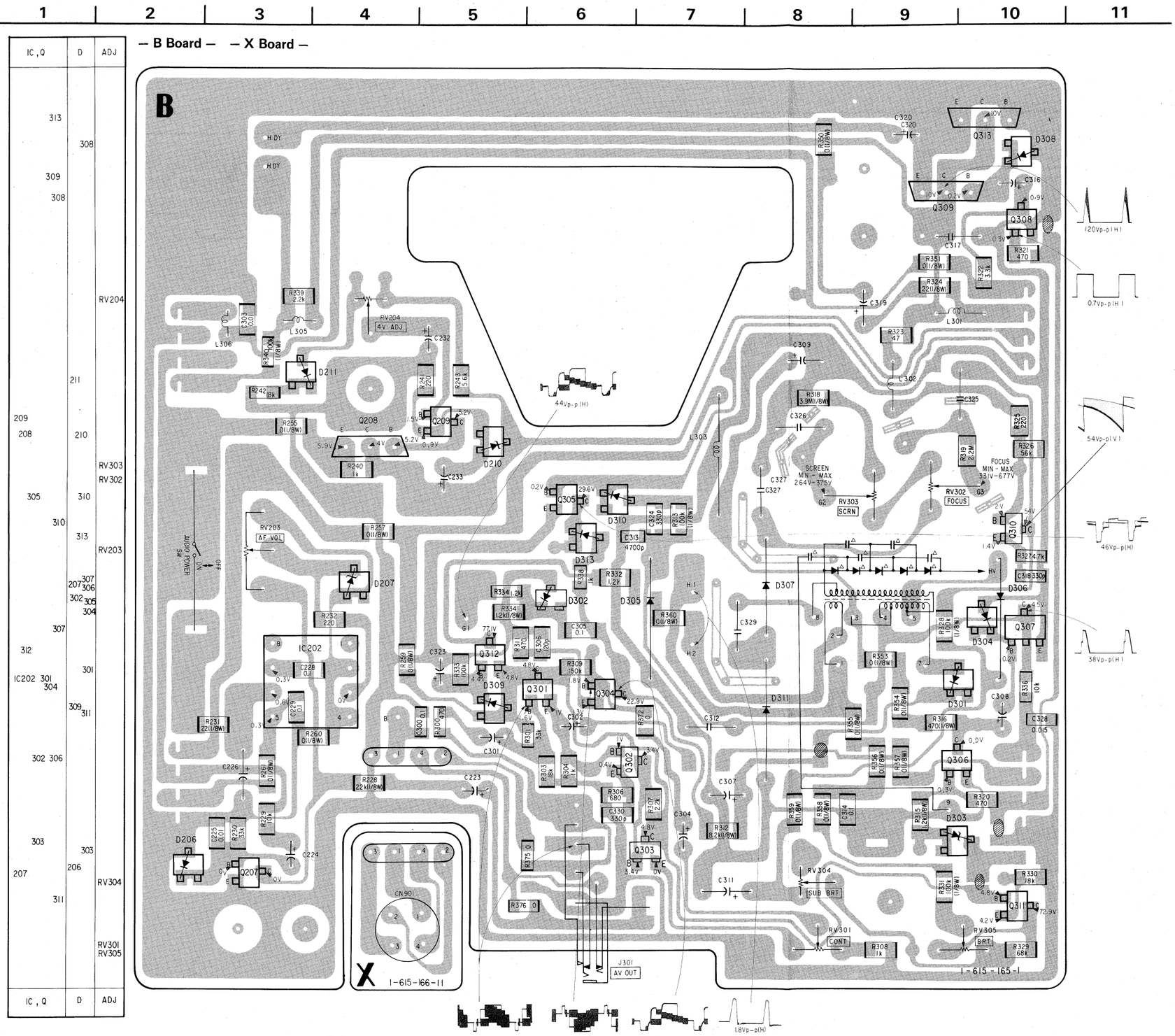
– G Board –

IC,Q	206 205	209 204	205 202	204 203	IC201 201	203 208	202	201	IC,Q
D									D
ADJ	RV202		RV201						ADJ



[VIDEO OUT, AUDIO OUT, H. OUT] B X B X

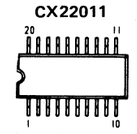
— B Board — — X Board —



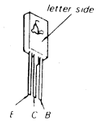
IC, Q	D	ADJ
313		
	308	
309		
308		
		RV204
	211	
209		
208	210	
		RV303
		RV302
305	310	
310		
	313	
		RV203
	307	
	207 306	
	302 305	
	304	
307		
312		
	301	
IC202 301 304		
	309 311	
302 306		
303		
	303	
207	206	
		RV304
311		
		RV301 RV305
IC, Q	D	ADJ

3-5. SEMICONDUCTORS

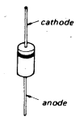
CX22011



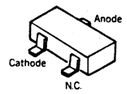
2SB772
2SD882



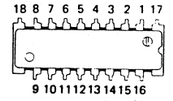
ERA81-004
ERA81-005
ESJA57-04
1N4005



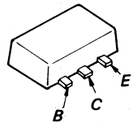
1SS222



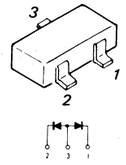
HA11441



2SD999
2SD1615A-GP



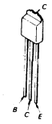
1S2835



RD10M-B2
RD10M-B3
RD3.3M-B1
RD3.3M-B2
RD3.9M-R1
RD4.3M-B1
RD4.3M-B3
RD4.7M-B1
RD5.6M-B1
RD8.2M-B1
RD8.2M-B2

NJM386D

2SD1083L



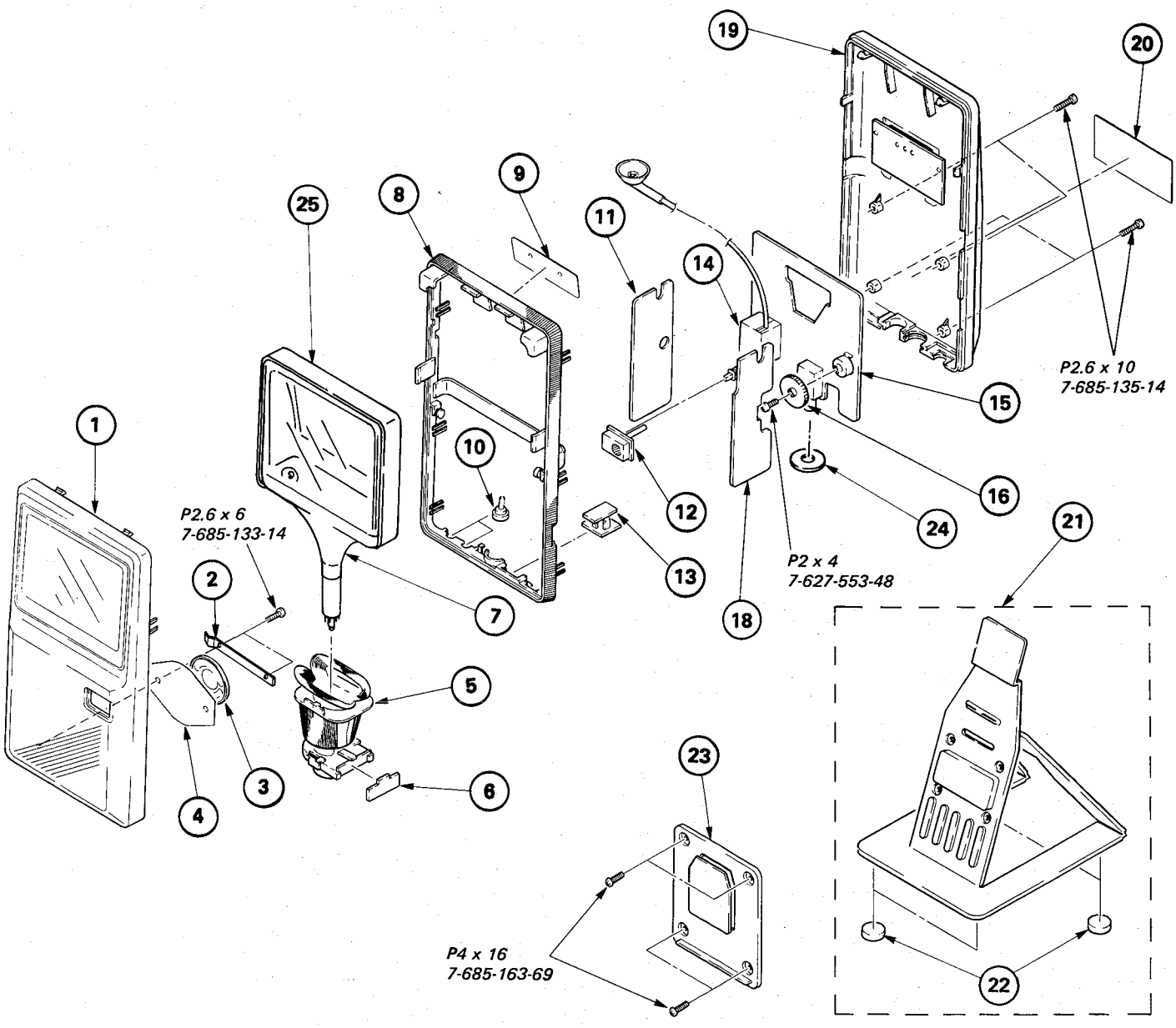
1SS123

2SA812
2SA1037K
2SA1162
2SC1623
2SC1654
2SC2712
2SC2812

SECTION 4
EXPLODED VIEW

NOTE:
- Items with no part number and no description are not stocked because they are seldom required for routine service.
- The construction parts of an assembled part are indicated with a collation number in the remark column.
- Items marked " ★ " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.



No.	Part No.	Description	Remark
1	X-4375-839-1	CASE ASSY, UPPER	
2	*4-375-805-01	RETAINER, S.P	
3	1-503-293-00	SPEAKER	
4	4-375-849-01	SHEET, BLIND, SPEAKER	
5	⚠1-451-257-21	DEFLECTION YOKE	
6	*1-615-167-11	V BOARD	
7	⚠8-736-851-05	CRT (04JM)	
8	4-375-812-31	FRAME	
9	*4-375-804-01	PLATE, GROUND, CRT	
10	4-375-810-01	KNOB, BC	
11	*A-1311-129-A	D BOARD, COPLETE	
12	4-375-806-01	BUTTON, POWER	
13	*1-615-166-11	X BOARD	
14	⚠1-439-350-11	TRANSFORMER ASSY, FLYBACK	
15	*A-1340-816-A	B BOARD, COMPLETE	
16	4-375-801-01	KNOB, VOL	
18	*A-1291-005-A	G BOARD, COMPLETE	
19	X-4375-841-1	CASE ASSY, LOWER	
20	*4-379-337-01	LABEL, MODEL NUMBER	
21	X-4375-806-1	STAND ASSY	22
22	4-371-227-01	FOOT, RUBBER	
23	4-375-808-01	HOLDER	
24	*4-375-847-01	PLATE, BLIND, AV	
25	4-375-868-01	TAPE, PROTECTION	

B

SECTION 5
ELECTRICAL PARTS LIST

NOTE:

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.

• Items marked " * " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

• All variable and adjustable resistors have characteristic curve B, unless otherwise noted.

CAPACITORS
• MF : μF, PF : μμF

RESISTORS
• All resistors are in ohms
• F : nonflammable

COILS
• MMH : mH, UH : μH

• The components identified by ⊠ in this parts list have been carefully factory-selected for each set in order to satisfy regulations regarding X-ray radiation. Should replacement be required, replace only with the value originally used.

Ref.No.	Part No.	Description			Remark
	*A-1340-816-A	B BOARD, COMPLETE **********			
	1-526-828-11	SOCKET ASSY, CRT			
		CAPACITOR			
C223	1-124-255-00	ELECT 1MF	20%	50V	
C224	1-124-222-00	ELECT 22MF	20%	6.3V	
C225	1-163-021-00	CERAMIC CHIP 0.01MF	10%	50V	
C226	1-124-142-00	ELECT 470MF	20%	10V	
C228	1-163-077-00	CERAMIC CHIP 0.1MF		50V	
C229	1-163-038-00	CERAMIC CHIP 0.1MF		25V	
C232	1-124-222-00	ELECT 22MF	20%	6.3V	
C233	1-124-225-00	ELECT 100MF	20%	6.3V	
C300	1-163-038-00	CERAMIC CHIP 0.1MF		25V	
C301	1-124-233-00	ELECT 10MF	20%	16V	
C302	1-124-233-00	ELECT 10MF	20%	16V	
C303	1-163-021-00	CERAMIC CHIP 0.01MF	10%	50V	
C304	1-124-245-00	ELECT 4.7MF	20%	16V	
C305	1-163-077-00	CERAMIC CHIP 0.1MF		50V	
C306	1-163-119-00	CERAMIC CHIP 120PF	5%	50V	
C307	1-123-384-00	ELECT 10MF	20%	100V	
C308	1-124-257-00	ELECT 2.2MF	20%	50V	
C309	1-124-604-00	ELECT 330MF	20%	10V	
C311	1-123-932-00	ELECT 4.7MF		160V	
C312 ⚠	1-108-587-12	MYLAR 0.022MF	5%	50V	
C313	1-163-017-00	CERAMIC CHIP 0.0047MF	10%	50V	
C314	1-163-077-00	CERAMIC CHIP 0.1MF		50V	
C316	1-124-257-00	ELECT 2.2MF	20%	50V	
C317	1-106-377-00	MYLAR 0.027MF	5%	200V	
C318	1-163-129-00	CERAMIC CHIP 330PF	10%	50V	
C319	1-123-333-00	ELECT 100MF	20%	25V	
C320	1-127-511-00	ELECT(SOLID) 6.8MF	20%	25V	
C321	1-163-833-00	CERAMIC CHIP 0.068MF		25V	
C323	1-124-222-00	ELECT 22MF	20%	6.3V	
C324	1-163-041-00	CERAMIC CHIP 330PF	10%	50V	
C325	1-162-147-00	CERAMIC 0.0022MF		1KV	
C326	1-162-146-00	CERAMIC 0.001MF		1KV	
C327	1-162-146-00	CERAMIC 0.001MF		1KV	
C328	1-163-023-00	CERAMIC CHIP 0.015MF	10%	50V	
C329	1-162-146-00	CERAMIC 0.001MF		1KV	
C330	1-163-129-00	CERAMIC CHIP 330PF	10%	50V	
		DIODE			
D206	8-719-100-03	DIODE 1S2835			
D207	8-719-105-57	DIODE RD3.9M-B1			
D210	8-719-105-45	DIODE RD3.3M-B1			
D211	8-719-100-03	DIODE 1S2835			
D301	8-719-108-19	DIODE 1SS222			
D302	8-719-108-19	DIODE 1SS222			
⊠ D303 ⚠		DIODE			
D304	8-719-100-03	DIODE 1S2835			
D305	8-719-981-01	DIODE ERA81-004			
D306	8-719-904-05	DIODE 1N4005			
D307	8-719-903-28	DIODE ESJA57-04			
D308	8-719-100-03	DIODE 1S2835			
D309	8-719-100-03	DIODE 1S2835			
D310	8-719-100-03	DIODE 1S2835			
D311	8-719-903-28	DIODE ESJA57-04			
D313	8-719-100-03	DIODE 1S2835			
		IC			
IC202	8-759-700-89	IC NJM386D			
		JACK			
J301	1-507-972-11	JACK, AV (WITH SWITCH)			
		COIL			
L301	1-407-499-00	MICRO INDUCTOR 3.9MMH			
L302	1-407-508-00	MICRO INDUCTOR 22MMH			
L303	1-408-121-00	MICRO INDUCTOR 22UH			
L305	1-459-612-11	HLC			
L306	1-408-970-21	MICRO INDUCTOR 10UH			
		TRANSISTOR			
Q207	8-729-100-66	TRANSISTOR 2SC1623			
Q208	8-729-177-23	TRANSISTOR 2SB772			
Q209	8-729-100-66	TRANSISTOR 2SC1623			
Q301	8-729-100-66	TRANSISTOR 2SC1623			
Q302	8-729-100-66	TRANSISTOR 2SC1623			
Q303	8-729-100-66	TRANSISTOR 2SC1623			
Q304	8-729-100-66	TRANSISTOR 2SC1623			
Q305	8-729-100-66	TRANSISTOR 2SC1623			
Q306	8-729-100-66	TRANSISTOR 2SC1623			
Q307	8-729-106-68	TRANSISTOR 2SD1615A-GP			
Q308	8-729-100-66	TRANSISTOR 2SC1623			
Q309	8-729-301-87	TRANSISTOR 2SD1083L			
Q310	8-729-103-52	TRANSISTOR 2SC1654			
Q311	8-729-103-52	TRANSISTOR 2SC1654			
Q312	8-729-103-52	TRANSISTOR 2SC1654			
Q313	8-729-301-87	TRANSISTOR 2SD1083L			
		RESISTOR			
R228	1-216-230-00	METAL CHIP	22K	5%	1/8W
R229	1-216-073-00	METAL CHIP	10K	5%	1/10W
R230	1-216-085-00	METAL CHIP	33K	5%	1/10W
R231	1-216-158-00	METAL CHIP	22	5%	1/8W
R232	1-216-033-00	METAL CHIP	220	5%	1/10W
R240	1-216-049-00	METAL CHIP	1K	5%	1/10W
R241	1-216-033-00	METAL CHIP	220	5%	1/10W
R242	1-216-055-00	METAL CHIP	1.8K	5%	1/10W
R243	1-216-067-00	METAL CHIP	5.6K	5%	1/10W
R255	1-216-296-00	METAL CHIP	0	5%	1/8W
R257	1-216-296-00	METAL CHIP	0	5%	1/8W
R259	1-216-296-00	METAL CHIP	0	5%	1/8W

Ref.No.	Part No.	Description				Remark
R260	1-216-296-00	METAL CHIP	0	5%	1/8W	
R261	1-216-296-00	METAL CHIP	0	5%	1/8W	
R300	1-216-041-00	METAL CHIP	470	5%	1/10W	
R301	1-216-085-00	METAL CHIP	33K	5%	1/10W	
R303	1-216-079-00	METAL CHIP	18K	5%	1/10W	
R304	1-216-049-00	METAL CHIP	1K	5%	1/10W	
R305	1-216-190-00	METAL CHIP	470	5%	1/8W	
R306	1-216-045-00	METAL CHIP	680	5%	1/10W	
R307	1-216-057-00	METAL CHIP	2.2K	5%	1/10W	
R308	1-216-049-00	METAL CHIP	1K	5%	1/10W	
R309	1-216-101-00	METAL CHIP	150K	5%	1/10W	
R311	1-216-041-00	METAL CHIP	470	5%	1/10W	
R312	1-216-220-00	METAL CHIP	8.2K	5%	1/8W	
R313	1-216-246-00	METAL CHIP	100K	5%	1/8W	
R314	1-216-121-00	METAL CHIP	1M	5%	1/10W	
R315	1-216-200-00	METAL CHIP	1.2K	5%	1/8W	
R316	1-216-190-00	METAL CHIP	470	5%	1/8W	
R318	1-216-274-00	METAL CHIP	1.5M	5%	1/8W	
R319	1-216-129-00	METAL CHIP	2.2M	5%	1/10W	
R320	1-216-041-00	METAL CHIP	470	5%	1/10W	
R321	1-216-041-00	METAL CHIP	470	5%	1/10W	
R322	1-216-061-00	METAL CHIP	3.3K	5%	1/10W	
R323	1-216-017-00	METAL CHIP	47	5%	1/10W	
R324	1-216-158-00	METAL CHIP	22	5%	1/8W	
R325	1-216-105-00	METAL CHIP	220K	5%	1/10W	
R326	1-216-091-00	METAL CHIP	56K	5%	1/10W	
R327	1-216-065-00	METAL CHIP	4.7K	5%	1/10W	
R328	1-216-246-00	METAL CHIP	100K	5%	1/8W	
R329	1-216-093-00	METAL CHIP	68K	5%	1/10W	
R330	1-216-079-00	METAL CHIP	18K	5%	1/10W	
R331	1-216-246-00	METAL CHIP	100K	5%	1/8W	
R332	1-216-200-00	METAL CHIP	1.2K	5%	1/8W	
R333	1-216-097-00	METAL CHIP	100K	5%	1/10W	
R334	1-216-200-00	METAL CHIP	1.2K	5%	1/8W	
R336	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R338	1-216-049-00	METAL CHIP	1K	5%	1/10W	
R339	1-216-057-00	METAL CHIP	2.2K	5%	1/10W	
R340	1-216-246-00	METAL CHIP	100K	5%	1/8W	
R350	1-216-296-00	METAL CHIP	0	5%	1/8W	
R351	1-216-296-00	METAL CHIP	0	5%	1/8W	
R353	1-216-296-00	METAL CHIP	0	5%	1/8W	
R354	1-216-296-00	METAL CHIP	0	5%	1/8W	
R355	1-216-296-00	METAL CHIP	0	5%	1/8W	
R356	1-216-296-00	METAL CHIP	0	5%	1/8W	
R357	1-216-296-00	METAL CHIP	0	5%	1/8W	
R358	1-216-296-00	METAL CHIP	0	5%	1/8W	
R359	1-216-296-00	METAL CHIP	0	5%	1/8W	
R360	1-216-296-00	METAL CHIP	0	5%	1/8W	
R361	1-216-295-00	METAL CHIP	0	5%	1/10W	
R372	1-216-295-00	METAL CHIP	0	5%	1/10W	
R374	1-216-022-00	METAL CHIP	75	5%	1/10W	
R375	1-216-295-00	METAL CHIP	0	5%	1/10W	
R376	1-216-295-00	METAL CHIP	0	5%	1/10W	
R377	1-216-295-00	METAL CHIP	0	5%	1/10W	

VARIABLE RESISTOR

RV203	1-230-824-11	RES, VAR, CARBON (WITH SW) 10K	
RV204	1-230-521-11	RES, ADJ, METAL GLAZE 2.2K	
RV301	1-226-428-00	RES, ADJ, CARBON 1K	
RV302	1-237-251-21	RES, ADJ, METAL FILM 4.7M	
RV303	1-237-250-41	RES, ADJ, METAL GLAZE 4.7M	
RV304	1-230-529-11	RES, ADJ, METAL GLAZE 470K	
RV305	1-226-433-00	RES, ADJ, CARBON 50K	

TRANSFORMER

T301 ⚠	1-439-350-11	TRANSFORMER ASSY, FLYBACK	

****

	*A-1291-005-A	G BOARD, COMPLETE	
		**********	
	*1-533-146-00	HOLDER, FUSE	

CAPACITOR

C201	1-163-021-00	CERAMIC CHIP	0.01MF	10%	50V
C202	1-123-839-00	ELECT	1000MF	20%	16V
C203	1-163-055-00	CERAMIC CHIP	0.0047MF	10%	50V
C204	1-124-253-00	ELECT	0.47MF	20%	50V
C205	1-124-222-00	ELECT	22MF	20%	6.3V
C206	1-163-145-00	CERAMIC CHIP	0.0015MF	10%	50V
C207	1-124-258-00	ELECT	3.3MF	20%	50V
C208	1-124-258-00	ELECT	3.3MF	20%	50V
C209	1-124-233-00	ELECT	10MF	20%	16V
C210	1-124-233-00	ELECT	10MF	20%	16V
C211	1-124-140-00	ELECT	220MF	20%	10V
C212	1-163-119-00	CERAMIC CHIP	120PF	5%	50V
C213	1-163-016-00	CERAMIC CHIP	0.0039MF	10%	50V
C214	1-163-016-00	CERAMIC CHIP	0.0039MF	10%	50V
C215	1-163-016-00	CERAMIC CHIP	0.0039MF	10%	50V
C216	1-163-119-00	CERAMIC CHIP	120PF	5%	50V
C217	1-163-129-00	CERAMIC CHIP	330PF	10%	50V
C218	1-163-016-00	CERAMIC CHIP	0.0039MF	10%	50V
C219	1-124-258-00	ELECT	3.3MF	20%	50V
C220	1-163-017-00	CERAMIC CHIP	0.0047MF	10%	50V
C221	1-163-021-00	CERAMIC CHIP	0.01MF	10%	50V
C222	1-124-599-00	ELECT	220MF	20%	25V
C230	1-124-224-00	ELECT	47MF	20%	6.3V
C231	1-124-224-00	ELECT	47MF	20%	6.3V
C234	1-163-038-00	CERAMIC CHIP	0.1MF		25V

CONNECTOR

CN201	*1-564-047-00	PIN, CONNECTOR (L TYPE) 4P
CN202	*1-564-047-00	PIN, CONNECTOR (L TYPE) 4P

NOTE:

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Ref.No.	Part No.	Description				Remark
		DIODE				
▣ D201 ⚠		DIODE				
D202	8-719-100-03	DIODE 1S2835				
D203	8-719-100-03	DIODE 1S2835				
D204	8-719-100-03	DIODE 1S2835				
D205	8-719-100-03	DIODE 1S2835				
▣ D208 ⚠		DIODE				
D209	8-719-106-53	DIODE RD10M-B2				
		FUSE				
F201 ⚠	1-532-570-11	FUSE, GLASS TUBE 1.25A/125V				
		IC				
IC201	8-759-600-26	IC CX22011				
		JACK				
J201	1-507-838-00	JACK				
J202	1-507-563-00	D C JACK				
		COIL				
L201	1-459-611-11	COIL, CHOKE 600UH				
		TRANSISTOR				
Q201	8-729-177-23	TRANSISTOR 2SB772				
Q202	8-729-100-66	TRANSISTOR 2SC1623				
Q203	8-729-100-66	TRANSISTOR 2SC1623				
Q204	8-729-100-66	TRANSISTOR 2SC1623				
Q205	8-729-100-66	TRANSISTOR 2SC1623				
Q206	8-729-106-68	TRANSISTOR 2SD1615A-GP				
		RESISTOR				
R202	1-216-041-00	METAL CHIP	470	5%	1/10W	
▣ R203 ⚠		METAL CHIP			1/10W	
R204	1-216-075-00	METAL CHIP	12K	5%	1/10W	
R205	1-216-069-00	METAL CHIP	6.8K	5%	1/10W	
R206	1-216-017-00	METAL CHIP	47	5%	1/10W	
R207	1-216-081-00	METAL CHIP	22K	5%	1/10W	
R208	1-216-077-00	METAL CHIP	15K	5%	1/10W	
R209	1-216-065-00	METAL CHIP	4.7K	5%	1/10W	
R210	1-216-041-00	METAL CHIP	470	5%	1/10W	
R211	1-216-049-00	METAL CHIP	1K	5%	1/10W	
R214	1-216-081-00	METAL CHIP	22K	5%	1/10W	
R215	1-216-077-00	METAL CHIP	15K	5%	1/10W	
R216	1-216-097-00	METAL CHIP	100K	5%	1/10W	
R217	1-216-078-00	METAL CHIP	16K	5%	1/10W	
R218	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R219	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R220	1-216-129-00	METAL CHIP	2.2M	5%	1/10W	
R221	1-216-093-00	METAL CHIP	68K	5%	1/10W	
R222	1-216-077-00	METAL CHIP	15K	5%	1/10W	
R223	1-216-045-00	METAL CHIP	680	5%	1/10W	
R224	1-216-045-00	METAL CHIP	680	5%	1/10W	
R225	1-216-049-00	METAL CHIP	1K	5%	1/10W	
R226	1-216-081-00	METAL CHIP	22K	5%	1/10W	
R227	1-216-041-00	METAL CHIP	470	5%	1/10W	
R234	1-216-156-00	METAL CHIP	18	5%	1/8W	
R235	1-216-156-00	METAL CHIP	18	5%	1/8W	
R236	1-216-295-00	METAL CHIP	0	5%	1/10W	
R237	1-216-061-00	METAL CHIP	3.3K	5%	1/10W	
R238	1-216-049-00	METAL CHIP	1K	5%	1/10W	
R239	1-216-049-00	METAL CHIP	1K	5%	1/10W	
R250	1-216-296-00	METAL CHIP	0	5%	1/8W	
R251	1-216-296-00	METAL CHIP	0	5%	1/8W	
R252	1-216-296-00	METAL CHIP	0	5%	1/8W	
R270	1-216-295-00	METAL CHIP	0	5%	1/10W	
R271	1-216-295-00	METAL CHIP	0	5%	1/10W	
R272	1-216-295-00	METAL CHIP	0	5%	1/10W	
R273	1-216-295-00	METAL CHIP	0	5%	1/10W	
R274	1-216-295-00	METAL CHIP	0	5%	1/10W	
R275	1-216-295-00	METAL CHIP	0	5%	1/10W	
		VARIABLE RESISTOR				
RV201	1-230-610-11	RES, ADJ, CARBON 5K				
RV202	1-228-919-00	RES, ADJ, CARBON 1K				
		SWITCH				
S201	1-554-358-00	SWITCH, PUSH				
**********						
	*A-1311-129-A	D BOARD, COMPLETE				
		**********				
		CAPACITOR				
C501	1-124-225-00	ELECT	100MF	20%	6.3V	
C502	1-124-233-00	ELECT	10MF	20%	16V	
C503	1-163-119-00	CERAMIC CHIP	120PF	5%	50V	
C504	1-163-035-00	CERAMIC CHIP	0.047MF		50V	
C507	1-124-255-00	ELECT	1MF	20%	50V	
C508	1-163-055-00	CERAMIC CHIP	0.0047MF	10%	50V	
C509	1-163-209-00	CERAMIC CHIP	0.0015MF	5%	50V	
C510	1-163-209-00	CERAMIC CHIP	0.0015MF	5%	50V	
C511	1-131-387-00	TANTALUM	47MF	20%	6.3V	
C512	1-163-038-00	CERAMIC CHIP	0.1MF		25V	
C513	1-163-017-00	CERAMIC CHIP	0.0047MF	10%	50V	
C514	1-163-024-00	CERAMIC CHIP	0.018MF	10%	50V	
C516	1-131-361-00	TANTALUM	2.2MF	10%	20V	
C517	1-131-361-00	TANTALUM	2.2MF	10%	20V	
C518	1-163-119-00	CERAMIC CHIP	120PF	5%	50V	
C519	1-124-255-00	ELECT	1MF	20%	50V	
C520	1-124-225-00	ELECT	100MF	20%	6.3V	
C521	1-124-255-00	ELECT	1MF	20%	50V	
C522	1-124-222-00	ELECT	22MF	20%	6.3V	
C523	1-163-119-00	CERAMIC CHIP	120PF	5%	50V	

- The components identified by ▣ in this parts list have been carefully factory-selected for each set in order to satisfy regulations regarding X-ray radiation. Should replacement be required, replace only with the value originally used.

NOTE:

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Ref.No.	Part No.	Description				Remark
C524	1-124-222-00	ELECT	22MF	20%	6.3V	
C525	1-124-242-00	ELECT	33MF	20%	16V	
C526	1-124-245-00	ELECT	4.7MF	20%	35V	
C527	1-163-021-00	CERAMIC CHIP	0.01MF	10%	50V	
C528	1-124-258-00	ELECT	3.3MF	20%	50V	
C531	1-124-587-11	ELECT	220MF	20%	6.3V	
		CONNECTOR				
CN501	*1-564-047-00	PIN, CONNECTOR (L TYPE) 4P				
CN502	*1-564-047-00	PIN, CONNECTOR (L TYPE) 4P				
		DIODE				
D501	8-719-100-03	DIODE 1S2835				
D502	8-719-100-03	DIODE 1S2835				
D503	8-719-100-03	DIODE 1S2835				
D504	8-719-101-23	DIODE 1SS123				
D506	8-719-100-03	DIODE 1S2835				
		IC				
IC501	8-759-314-41	IC HA11441				
		TRANSISTOR				
Q501	8-729-199-92	TRANSISTOR 2SD999				
Q502	8-729-100-76	TRANSISTOR 2SA812				
Q503	8-729-100-66	TRANSISTOR 2SC1623				
Q504	8-729-100-66	TRANSISTOR 2SC1623				
Q505	8-729-100-76	TRANSISTOR 2SA812				
Q506	8-729-188-23	TRANSISTOR 2SD882				
Q507	8-729-177-23	TRANSISTOR 2SB772				
Q508	8-729-100-66	TRANSISTOR 2SC1623				
Q509	8-729-100-76	TRANSISTOR 2SA812				
Q510	8-729-100-66	TRANSISTOR 2SC1623				
		RESISTOR				
R501	1-216-174-00	METAL CHIP	100	5%	1/8W	
R502	1-216-059-00	METAL CHIP	2.7K	5%	1/10W	
R503	1-216-007-00	METAL CHIP	18	5%	1/10W	
R504	1-216-091-00	METAL CHIP	56K	5%	1/10W	
R505	1-216-107-00	METAL CHIP	270K	5%	1/10W	
R507	1-216-069-00	METAL CHIP	6.8K	5%	1/10W	
R508	1-216-097-00	METAL CHIP	100K	5%	1/10W	
R509	1-216-228-00	METAL CHIP	18K	5%	1/8W	
R510	1-216-041-00	METAL CHIP	470	5%	1/10W	
R511	1-216-168-00	METAL CHIP	56	5%	1/8W	
R512	1-216-061-00	METAL CHIP	3.3K	5%	1/10W	
R513	1-216-053-00	METAL CHIP	1.5K	5%	1/10W	
R514	1-216-061-00	METAL CHIP	3.3K	5%	1/10W	
R515	1-216-087-00	METAL CHIP	39K	5%	1/10W	
R516	1-216-119-00	METAL CHIP	820K	5%	1/10W	
R518	1-216-190-00	METAL CHIP	470	5%	1/8W	
R519	1-216-093-00	METAL CHIP	68K	5%	1/10W	
R520	1-216-045-00	METAL CHIP	680	5%	1/10W	
R521	1-216-033-00	METAL CHIP	220	5%	1/10W	
R522	1-216-007-00	METAL CHIP	18	5%	1/10W	
R523	1-216-049-00	METAL CHIP	1K	5%	1/10W	
R524	1-216-242-00	METAL CHIP	68K	5%	1/8W	
R525	1-216-061-00	METAL CHIP	3.3K	5%	1/10W	
R526	1-216-057-00	METAL CHIP	2.2K	5%	1/10W	
R527	1-216-097-00	METAL CHIP	100K	5%	1/10W	
R528	1-216-091-00	METAL CHIP	56K	5%	1/10W	
R529	1-216-097-00	METAL CHIP	100K	5%	1/10W	
R530	1-216-049-00	METAL CHIP	1K	5%	1/10W	
R531	1-216-045-00	METAL CHIP	680	5%	1/10W	
R532	1-216-081-00	METAL CHIP	22K	5%	1/10W	
R533	1-216-077-00	METAL CHIP	15K	5%	1/10W	
R534	1-216-095-00	METAL CHIP	82K	5%	1/10W	
R535	1-216-065-00	METAL CHIP	4.7K	5%	1/10W	
R536	1-216-134-00	METAL CHIP	2.2	5%	1/8W	
R537	1-216-168-00	METAL CHIP	56	5%	1/8W	
R538	1-216-085-00	METAL CHIP	33K	5%	1/10W	
R539	1-216-057-00	METAL CHIP	2.2K	5%	1/10W	
R540	1-216-077-00	METAL CHIP	15K	5%	1/10W	
R541	1-216-065-00	METAL CHIP	4.7K	5%	1/10W	
R542	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R543	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R544	1-216-228-00	METAL CHIP	18K	5%	1/8W	
R546	1-216-061-00	METAL CHIP	3.3K	5%	1/10W	
R547	1-216-093-00	METAL CHIP	68K	5%	1/10W	
R548	1-216-200-00	METAL CHIP	1.2K	5%	1/8W	
R549	1-216-055-00	METAL CHIP	1.8K	5%	1/10W	
R550	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R570	1-216-295-00	METAL CHIP	0	5%	1/10W	
R571	1-216-295-00	METAL CHIP	0	5%	1/10W	
R572	1-216-295-00	METAL CHIP	0	5%	1/10W	
R573	1-216-295-00	METAL CHIP	0	5%	1/10W	
		VARIABLE RESISTOR				
RV501	1-230-510-11	RES, ADJ, CARBON 10K				
RV502	1-230-610-11	RES, ADJ, CARBON 5K				
RV503	1-228-919-00	RES, ADJ, CARBON 1K				
RV504	1-228-919-00	RES, ADJ, CARBON 1K				
RV505	1-228-919-00	RES, ADJ, CARBON 1K				
RV506	1-230-611-11	RES, ADJ, CARBON 100K				
**********						
	*1-615-166-11	X BOARD *******				
	*4-375-803-01	BRACKET, CONNECTOR				
		CONNECTOR				
CN901	1-562-892-11	SOCKET, ROUND CONNECTOR 4P				
**********						
	*1-615-167-11	V BOARD *******				
**********						
		MISCELLANEOUS **********				
	⚠1-463-712-11	ADAPTOR, AC (AC-40E)				
L501	⚠1-451-257-21	DEFLECTION YOKE				
SP901	1-503-293-00	SPEAKER				
V901	⚠8-736-851-05	CRT (04JM)				

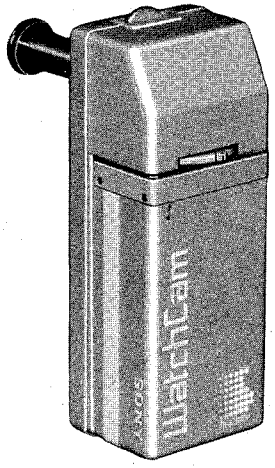
NOTE:

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

HVM-304

SERVICE MANUAL

AEP Model

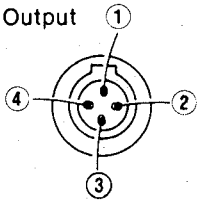


April, 1986

SPECIFICATIONS

HVM-304 black-and-white video camera

Image pickup tube	1/2-inch B/W SATICON™ tube
Signal system	CCIR standards
Scanning system	625 lines, 2:1 interlace
Frame	25 frames/sec.
Sync system	Internal
Scanning frequency	
	Horizontal 15.625 kHz
	Vertical 50 Hz
Lens	f = 11 mm, F1.8, fixed focus, auto-iris
Automatic controls	
	Auto-gain and auto-beam control
Minimum illumination	
	5 lux (10 lux when the camera mount and fish-eye lens are incorporated)
Output	4P MULTI connector
	① DC input, ② Video output, ③ Ground, ④ Audio output
	Video, 1.0V p-p, 75 ohms, sync negative
	Audio, −5dBs (436 mVrms) less than 10 kilohms



Input	Power, 5.1 through 15V DC, 6V DC normal
Microphone	Built-in electret condenser type
Power consumption	
	Approx. 0.9W when the auto-iris is opened
Dimensions	Approx. 52 × 32 × 100 mm (w/h/d) (2 1/8 × 1 5/16 × 3 15/16 inches)
Weight	Approx. 170g (6 oz)

Camera mount

View angle	Approx. 150 degrees (diagonally)
Door lens	Lens structure, 4 groups 5 elements
	Afocal system
Relay lens	Lens structure, 8 groups 8 elements
	Afocal magnification × 0.58 with special bayonet mount

Design and specifications are subject to change without notice.

MICROFILM

BLACK AND WHITE VIDEO CAMERA

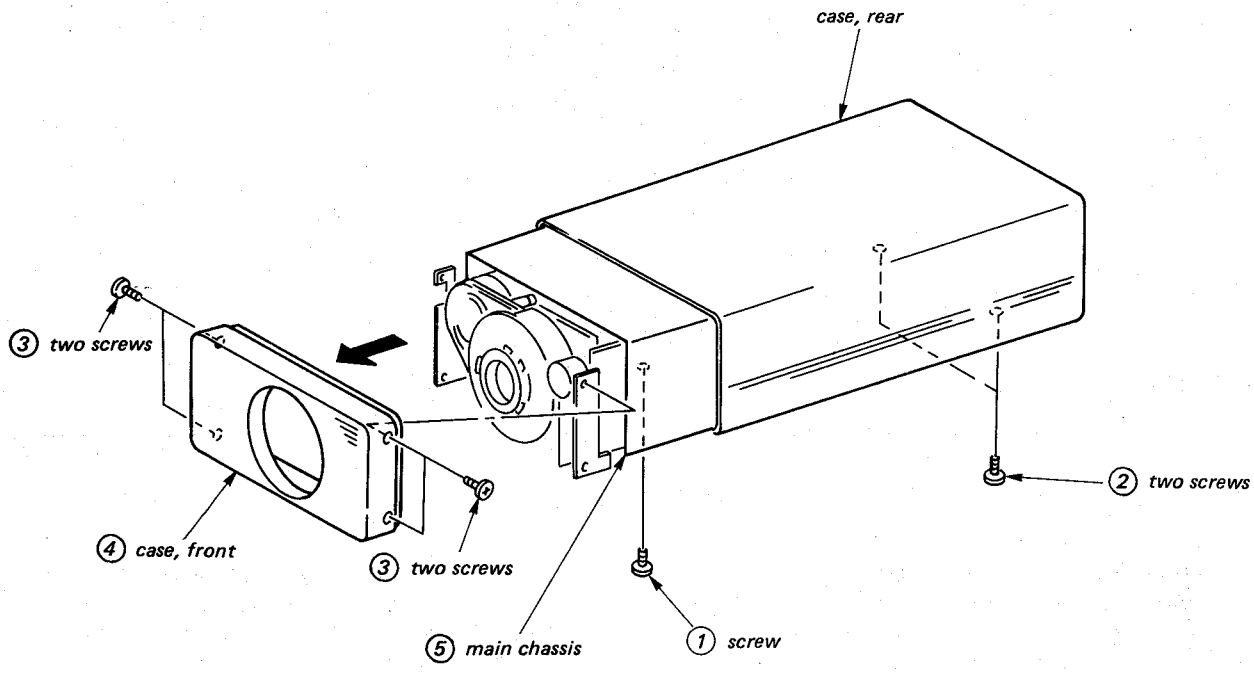
SONY®

CAMERA

SECTION 1
DISASSEMBLY AND REPLACEMENT

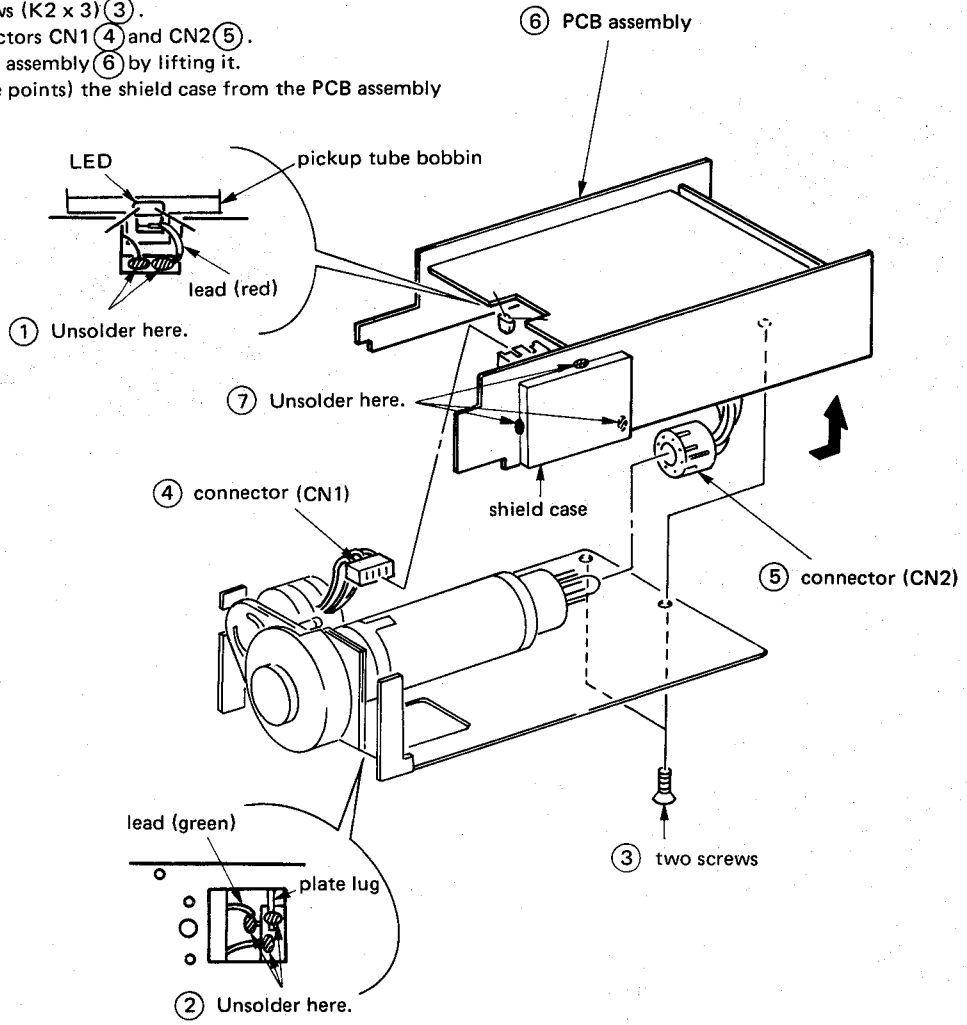
Note: Follow the disassembly procedure in the numerical order given.

1-1. CASE REMOVAL



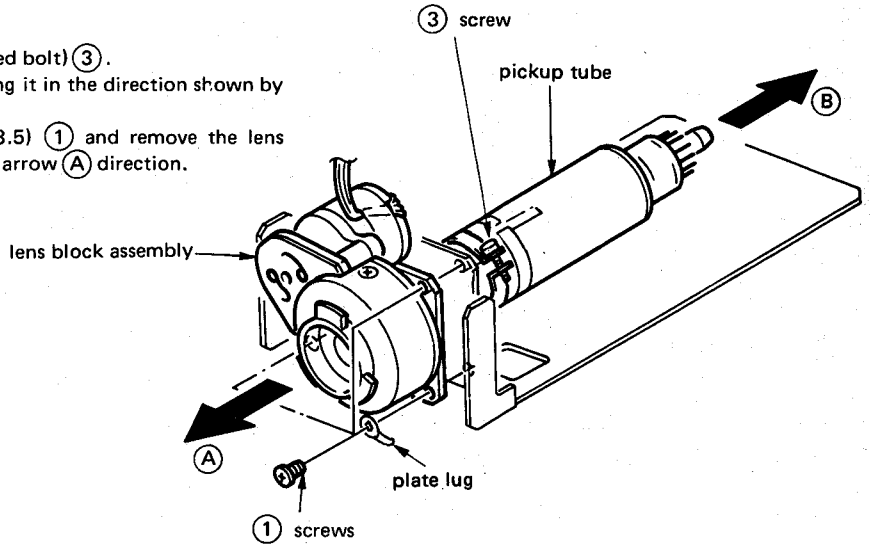
1-2. PCB ASSEMBLY AND SHIELD CASE REMOVAL

1) Pull out the LED from the pickup tube bobbin.
2) Unsolder the leads at two points (1) in the figure.
3) Unsolder the leads at three points (2).
4) Remove two screws (K2 x 3) (3).
5) Disconnect connectors CN1 (4) and CN2 (5).
6) Demount the PCB assembly (6) by lifting it.
7) Unsolder (at three points) the shield case from the PCB assembly and remove it (7).



1-3. PICKUP TUBE AND LENS BLOCK ASSEMBLY REMOVAL

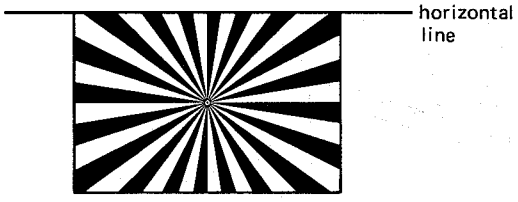
1) Loosen the screw (hexagonal headed bolt) (3).
2) Remove the pickup tube by pulling it in the direction shown by arrow (B).
3) Remove the three screws (P2 x 3.5) (1) and remove the lens block assembly by pulling it in the arrow (A) direction.



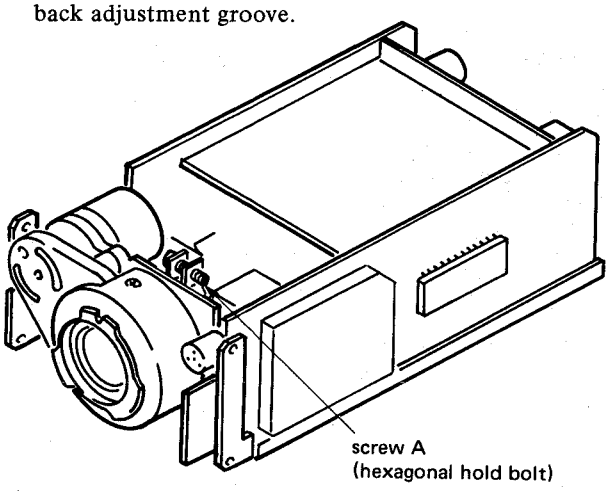
SECTION 2
ADJUSTMENTS

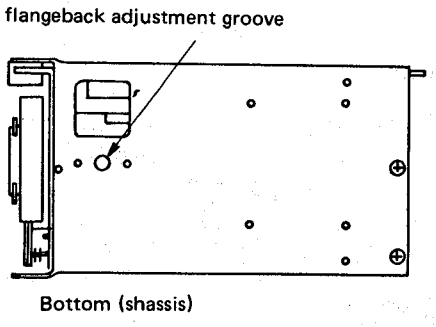
2-1. SETUP ADJUSTMENTS

Flangeback and horizontality adjustments
These adjustments have already been made at the factory before shipment. The focus has been adjusted at 3m.
1) Use a pattern as shown below as the subject.



2) Make both camera and subject level.
3) Loosen screw A, adjust the horizontality and focus by the flangeback adjustment groove and then retighten screw A.
To change the distance to the subject, loosen screw A and move the pickup tube back and forth in the flange back adjustment groove.



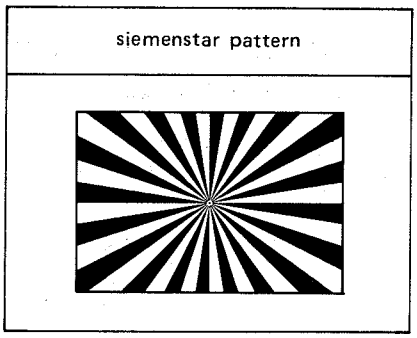


* The less the distance to the subject the more the distance between the pickup tube and lens.

- Lens
The lenses cannot be replaced. To change the focal length some optical modification is necessary.

2-2. CIRCUIT ADJUSTMENTS

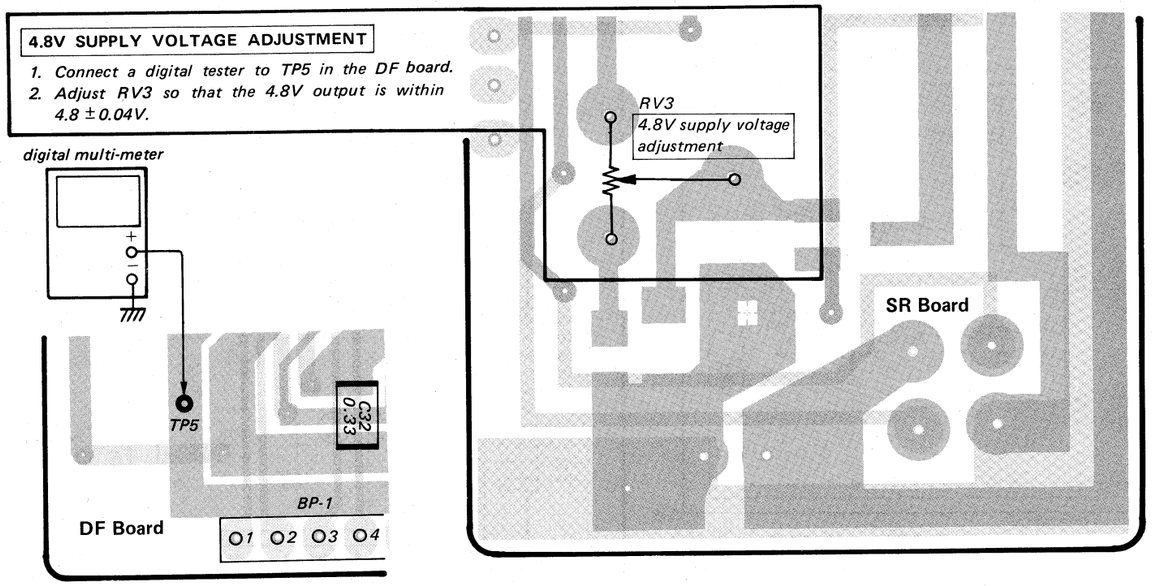
Adjustment tools and measuring instruments
- Digital tester
- Oscilloscope
- Monitor
- Siemenstar



2-2-1. SR Board Adjustment

4.8V SUPPLY VOLTAGE ADJUSTMENT

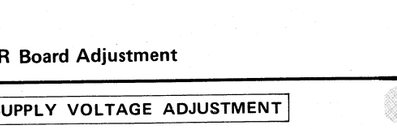
1. *Connect a digital tester to TP5 in the DF board.*
2. *Adjust RV3 so that the 4.8V output is within 4.8 ± 0.04V.*

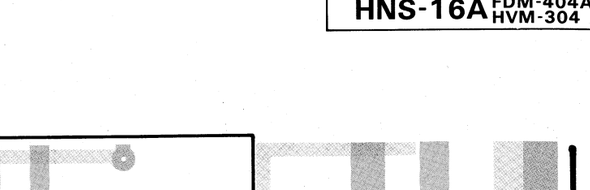


2-2-2. PW Board Adjustments

FOCUS ADJUSTMENT

Shoot the subject so that the siemenstar is at the center of the screen and adjust the focus with RV2.

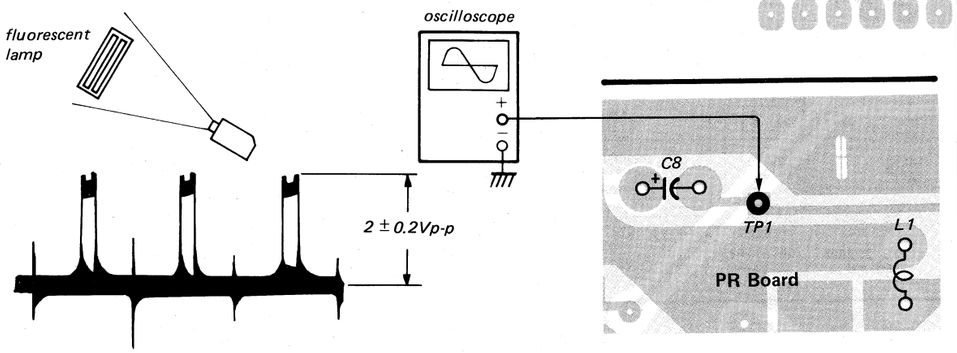




BEAM ADJUSTMENT

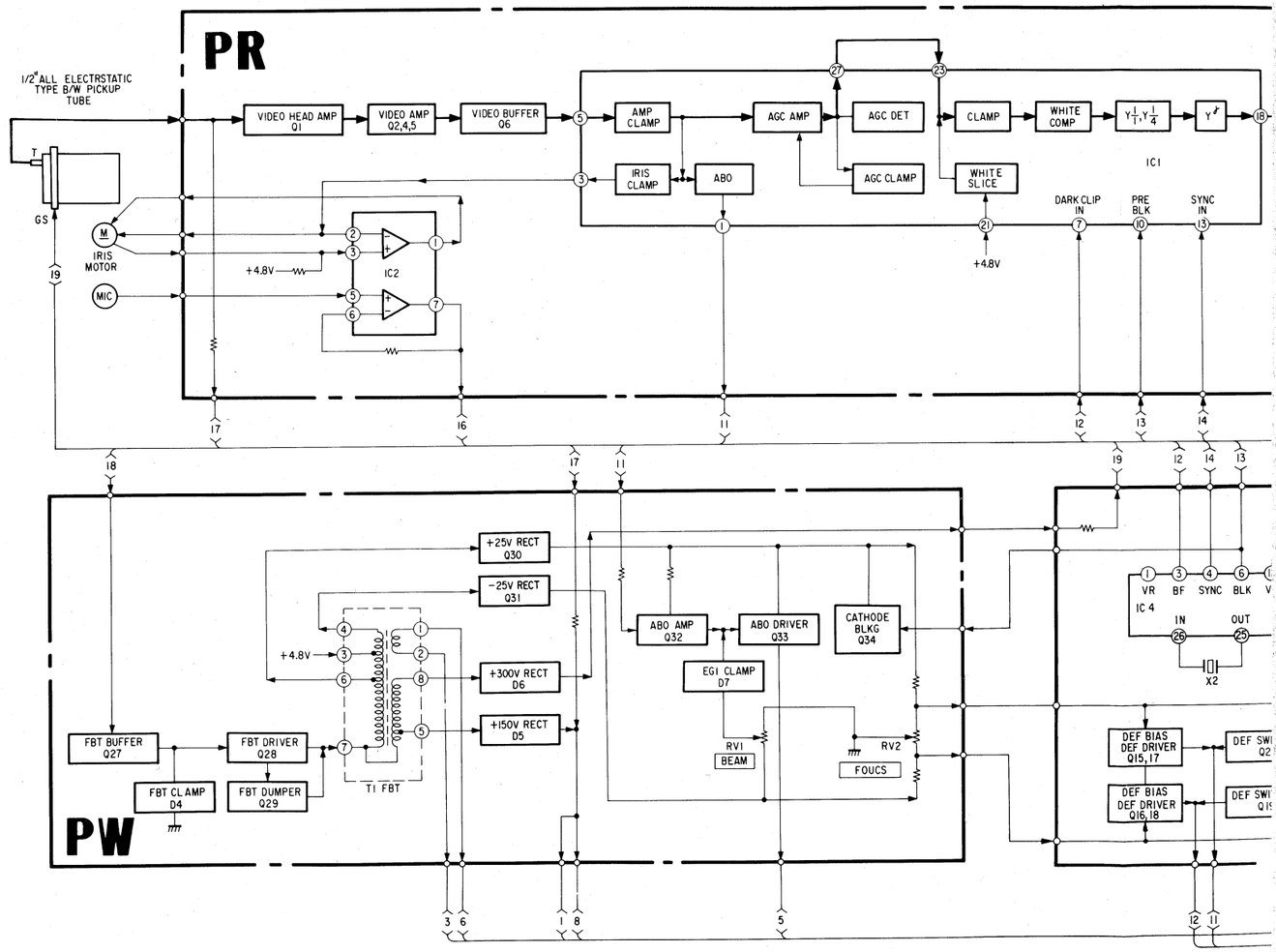
Shoot a fluorecent lamp or something like it and measure the PR card's TP1 with an oscilloscope. Adjust RV1 so that the p-p voltage of the waveform is 2 ± 0.2V.

* *At this time, move the camera right and left and up and down and check that no beam stop or oscillation occurs. If any oscillation occurs, reduce the beam amount down to 1.5Vp-p. If oscillation still persists, then short the circuit at the R67 short land and adjust RV1.*



SECTION 3 DIAGRAMS

3-1. BLOCK DIAGRAM

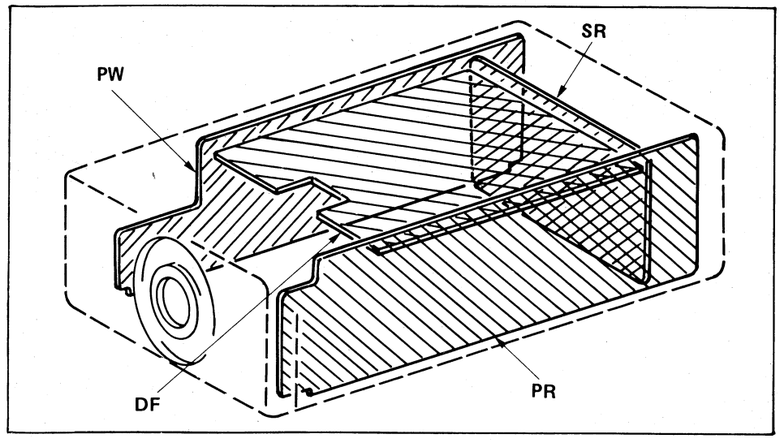


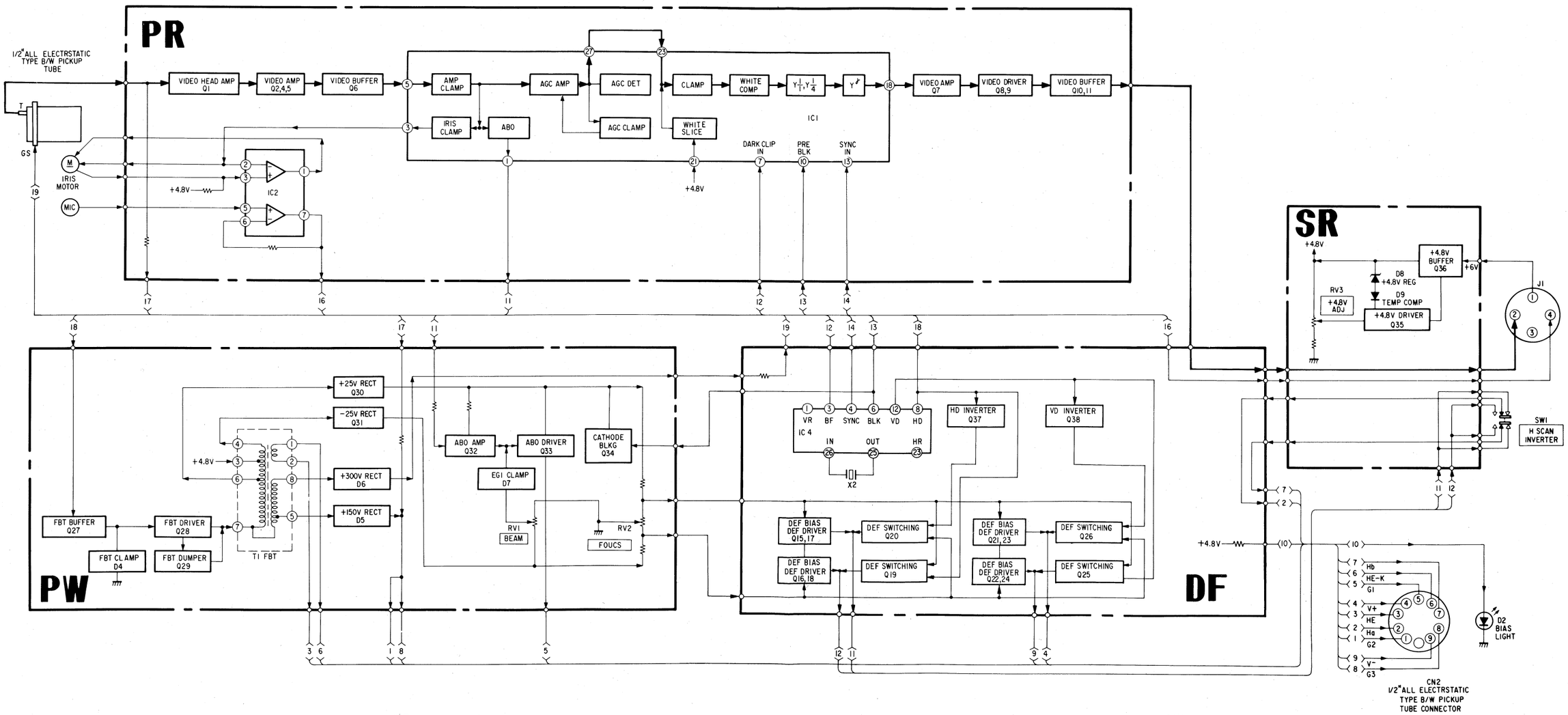
HNS-16A FDM-404A HVM-304

SECTION 3
DIAGRAMS

3-1. BLOCK DIAGRAM

3-2. CIRCUIT BOARDS LOCATION





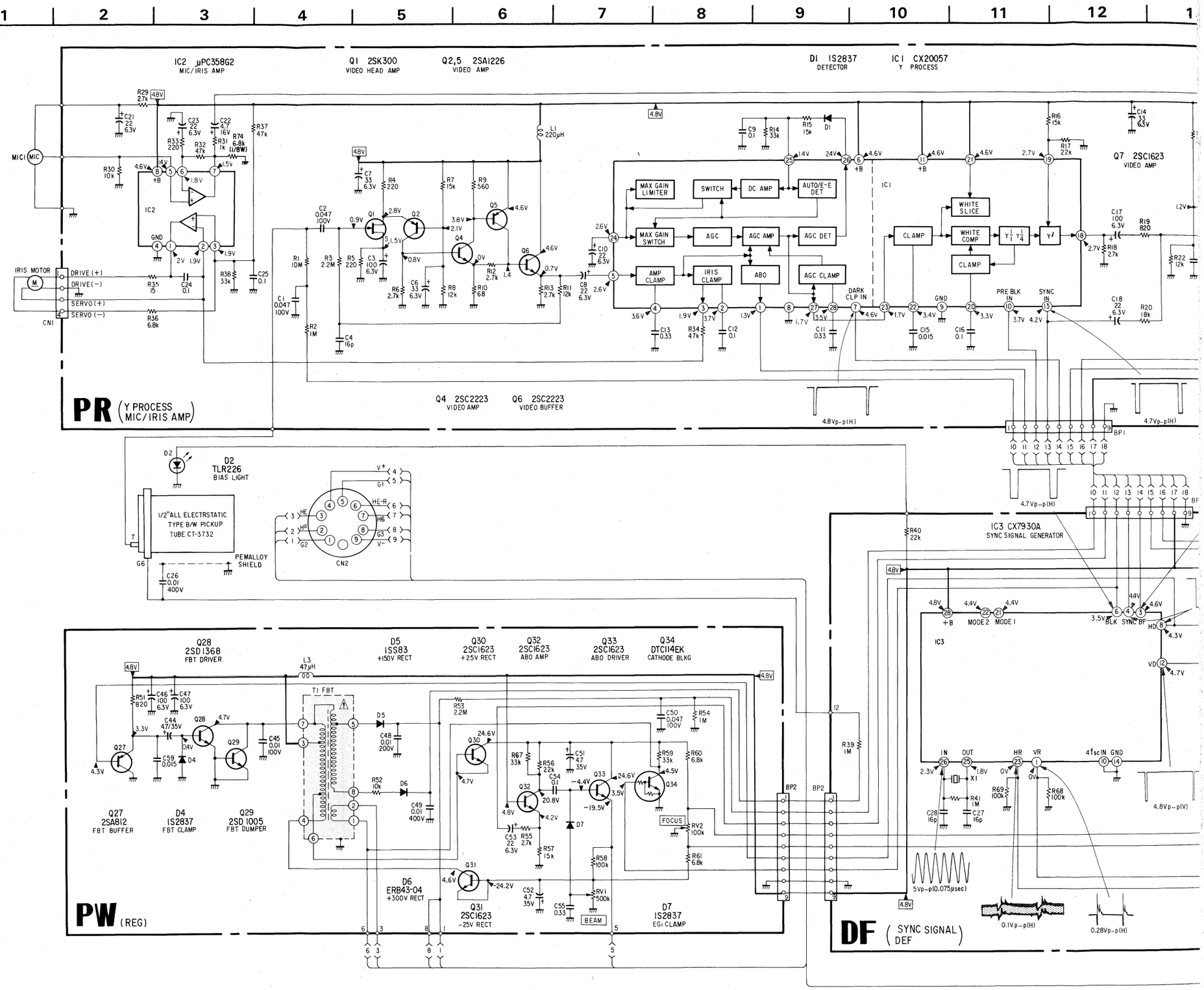
HNS-16A FDM-404A HVM-304 HNS-16A FD HV

3-3. SCHEMATIC DIAGRAM

Note:

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

- All capacitors are in μF unless otherwise noted. pF : μμF 50WV or less are not indicated except for electrolytics
- All resistors are in ohms, 1/6 W unless otherwise noted. kΩ : 1000Ω, MΩ : 1000kΩ
- : nonflammable resistor.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- △ : internal component.
- : panel designation.
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken with a 10MΩ digital multimeter.
- : adjustment for repair.
- Voltage variations may be noted due to normal production tolerances.
- : B+ bus.
- : B− bus.



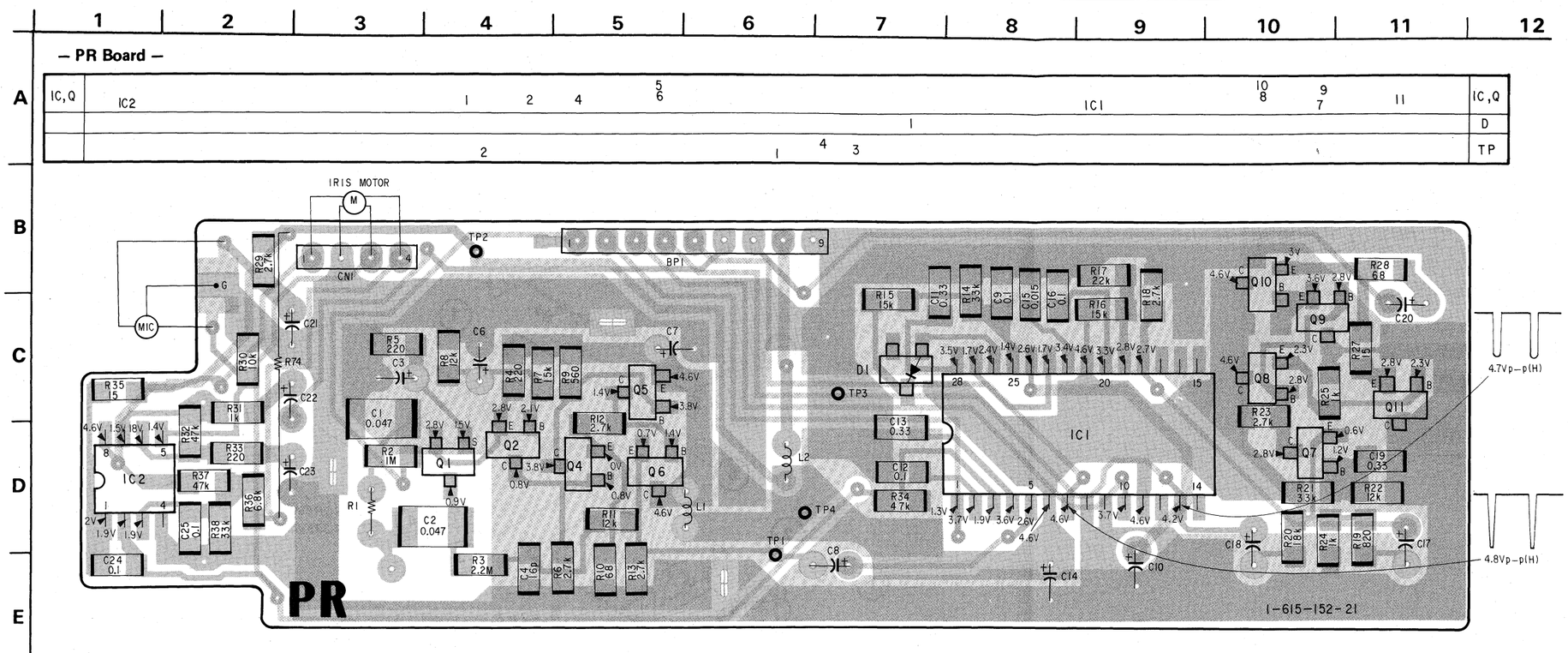
Q1 2SK300 VIDEO HEAD AMP
Q2,5 2SA1226 VIDEO AMP
D1 IS2837 DETECTOR
IC1 CX20057 Y PROCESS
Q8 2SC1623 VIDEO DRIVER
Q10 2SC1623 VIDEO BUFFER
Q7 2SC1623 VIDEO AMP
MAX GAIN LIMITER
SWITCH
DC AMP
AUTO/E-E DET
MAX GAIN SWITCH
AGC
AGC AMP
AGC DET
AMP CLAMP
IRIS CLAMP
ABO
AGC CLAMP
CLAMP
WHITE SLICE
WHITE COMP
CLAMP
DARK CLP IN
PRE BLK IN
SYNC IN
Q4 2SC2223 VIDEO AMP
Q6 2SC2223 VIDEO BUFFER
Q9 2SA812 VDIEO DRIVER
Q11 2SA812 VIDEO BUFFER
4.8Vp-p(H)
4.7Vp-p(H)
H SCAN INVERT
SW1
D8 RD3.0M-BI +4.8V REGULATOR
D9 IS2837 TEMP COMP
Q35 2SC1623 +4.8V DRIVER
Q36 2SB772 +4.8V BUFFER
SR (+4.8V REG)
AUDIO 4
VIDEO 2
PIN1
D2 TLR226 BIAS LIGHT
STATIC PICKUP
PEMALLOY SHIELD
CN2
IC3 CX7930A SYNC SIGNAL GENERATOR
MODE2
MODE1
BLK
SYNC
BF
HD
VD
Q37 DTA114EK H.D INVERTER
Q38 DTA114EK V.D INVERTER
Q19 DTA114EK DEF SWITCHING
Q21 2SA812 DEF BIAS
Q23 2SA812 DEF DRIVER
Q25 DTA114EK DEF SWITCHING
Q26 DTC114EK DEF SWITCHING
Q20 DTC114EK DEF SWITCHING
Q15 2SA812 DEF BIAS
Q16 2SC1623 DEF BIAS
Q17 2SA812 DEF DRIVER
Q18 2SC1623 DEF DRIVER
Q22 2SC1623 DEF BIAS
Q24 2SC1623 DEF DRIVER
22Vp-p(V)
28.5Vp-p(H)
5Vp-p(0.075μsec)
0.1Vp-p(H)
0.28Vp-p(H)
4.8Vp-p(V)
TP5
D5 1S583 +150V RECT
Q30 2SC1623 +25V RECT
Q32 2SC1623 ABO AMP
Q33 2SC1623 ABO DRIVER
Q34 DTC114EK CATHODE BLKG
TI FBT
Q29 2SD1005 FBT DUMPER
D6 ERB43-04 +300V RECT
Q31 2SC1623 -25V RECT
D7 1S2837 EG1 CLAMP
FOCUS
BEAM
DF (SYNC SIGNAL DEF)

3-4. PRINTED WIRING BOARDS

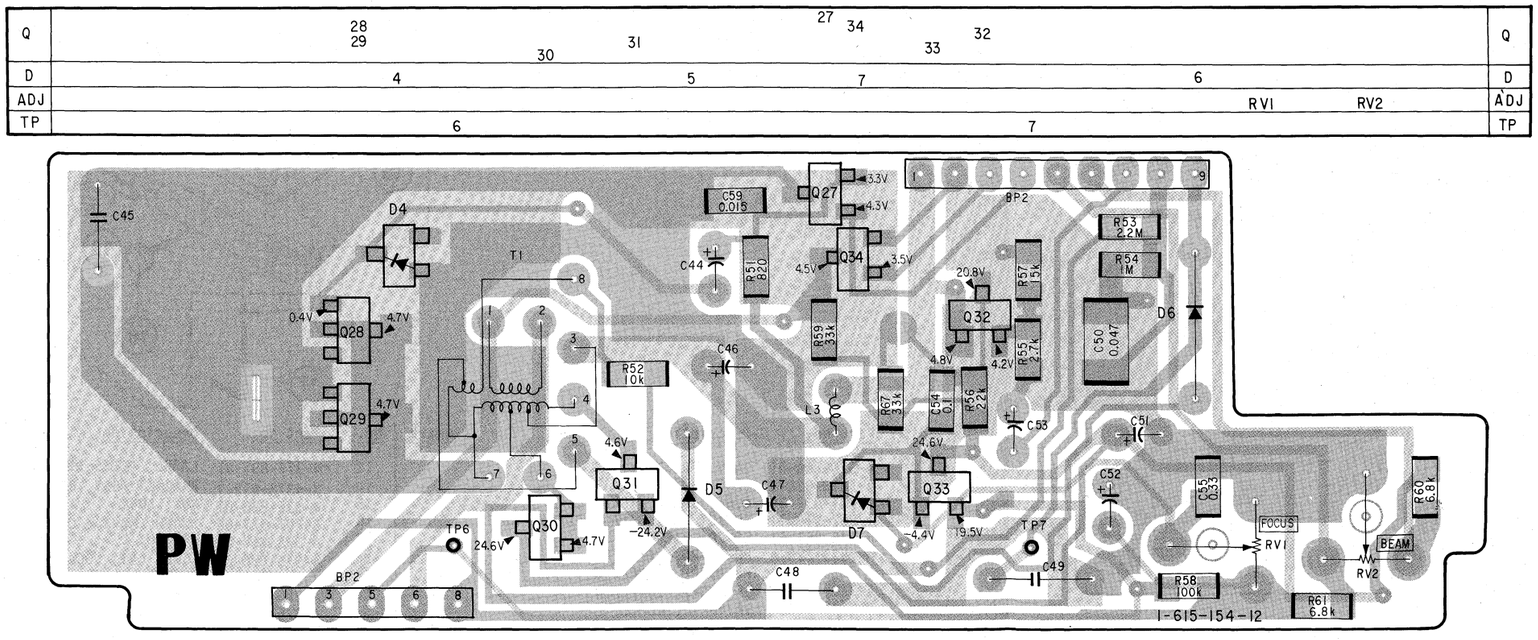
– Conductor Side –

[Y PROCESS, MIC/IRIS AMP] **PR** [REG] **PW** **PR** **PW**

– PR Board –

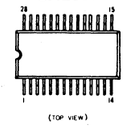


– PW Board –

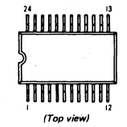


3-5. SEMICONDUCTORS

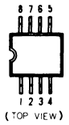
CX2057



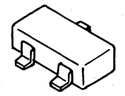
MSM6205GS-K



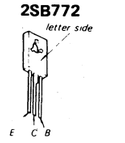
μPC358G2



2SA812
2SA1037K
2SA1162
2SA1179
2SA1226
2SC1623
2SC2223
2SC2412
2SC2712
2SC2714
2SC2812
2SC2813
2SC3052
DTA114EK
DTC114EK

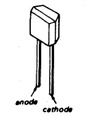


2SB772

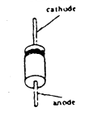


2SK300

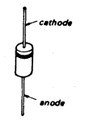
1S2837
MA151WK



1SS82
1SS83

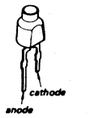


ERB43-04

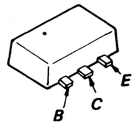


RD3.0M-B1

TLR226



2SD1005
2SD1368



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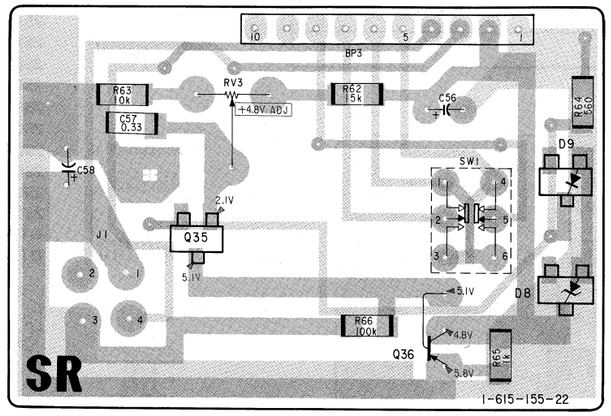
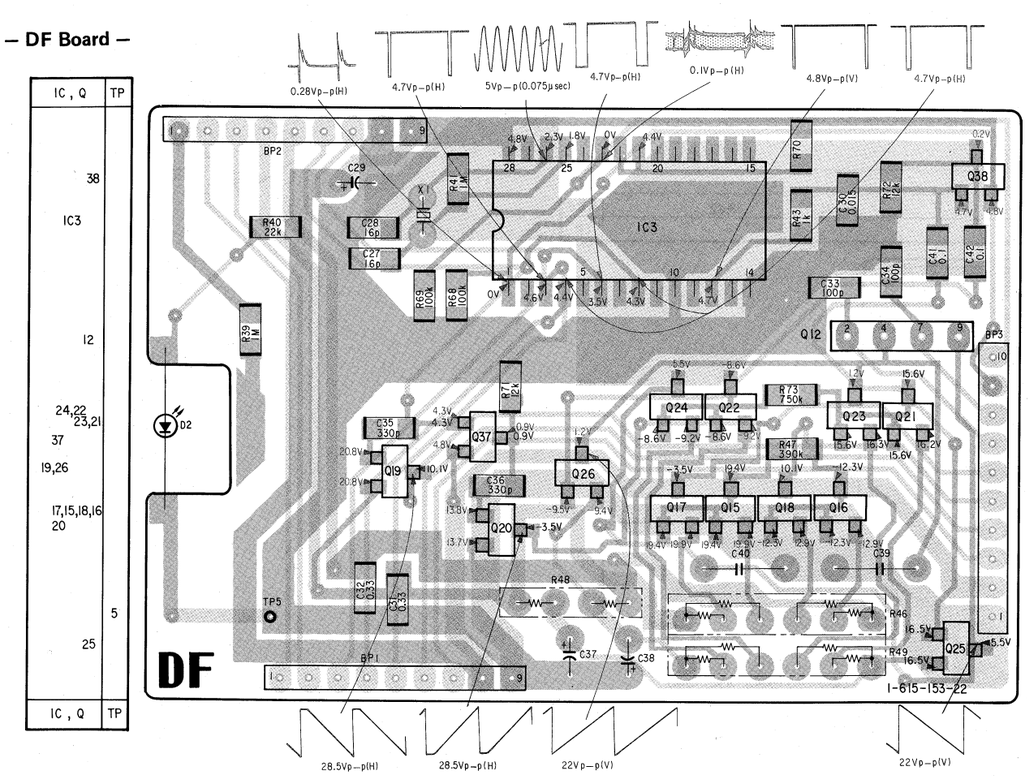
[+4.8V REG] **SR** [NTSC SIGNAL DEF] **DF**

— SR Board —



— DF Board —

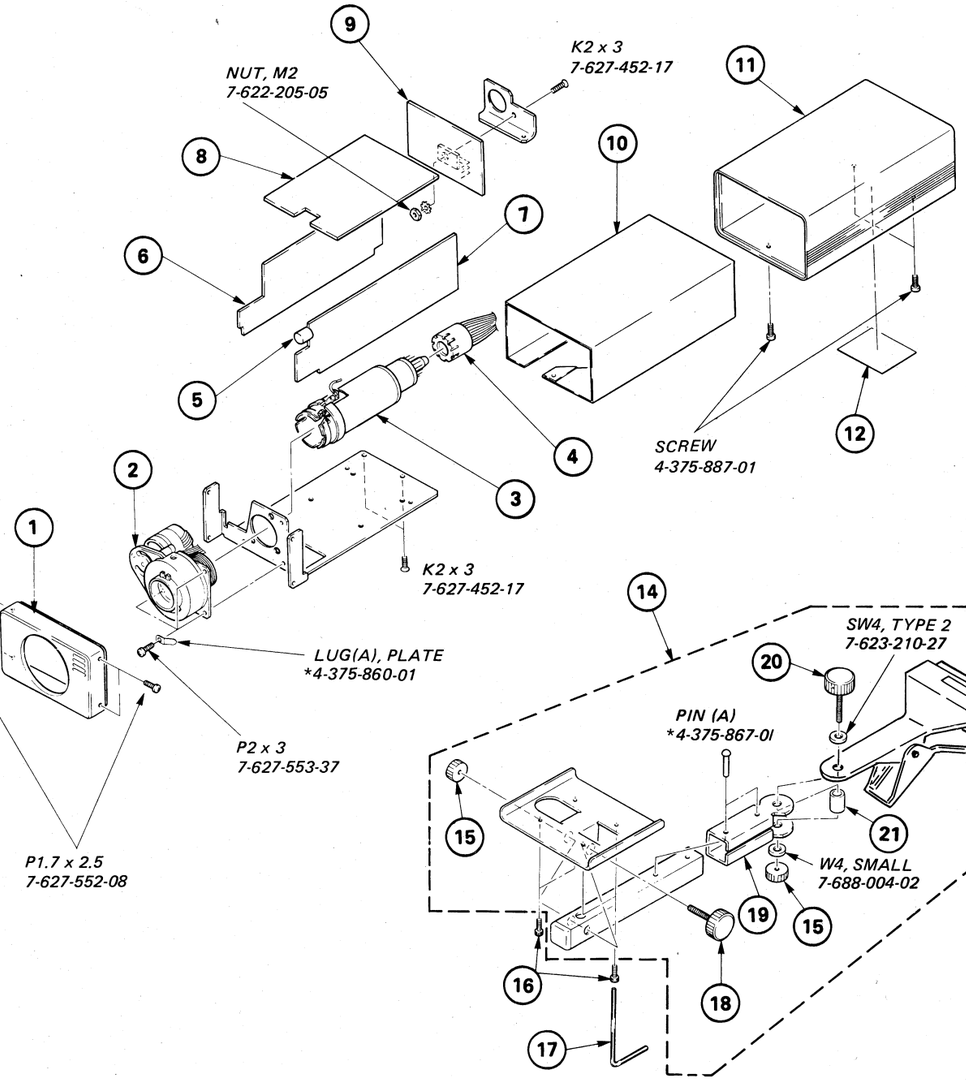


SECTION 4
EXPLODED VIEWS

NOTE:
- Items with no part number and no description are not stocked because they are seldom required for routine service.
- The construction parts of an assembled part are indicated with a collation number in the remark column.
- Items marked " * " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

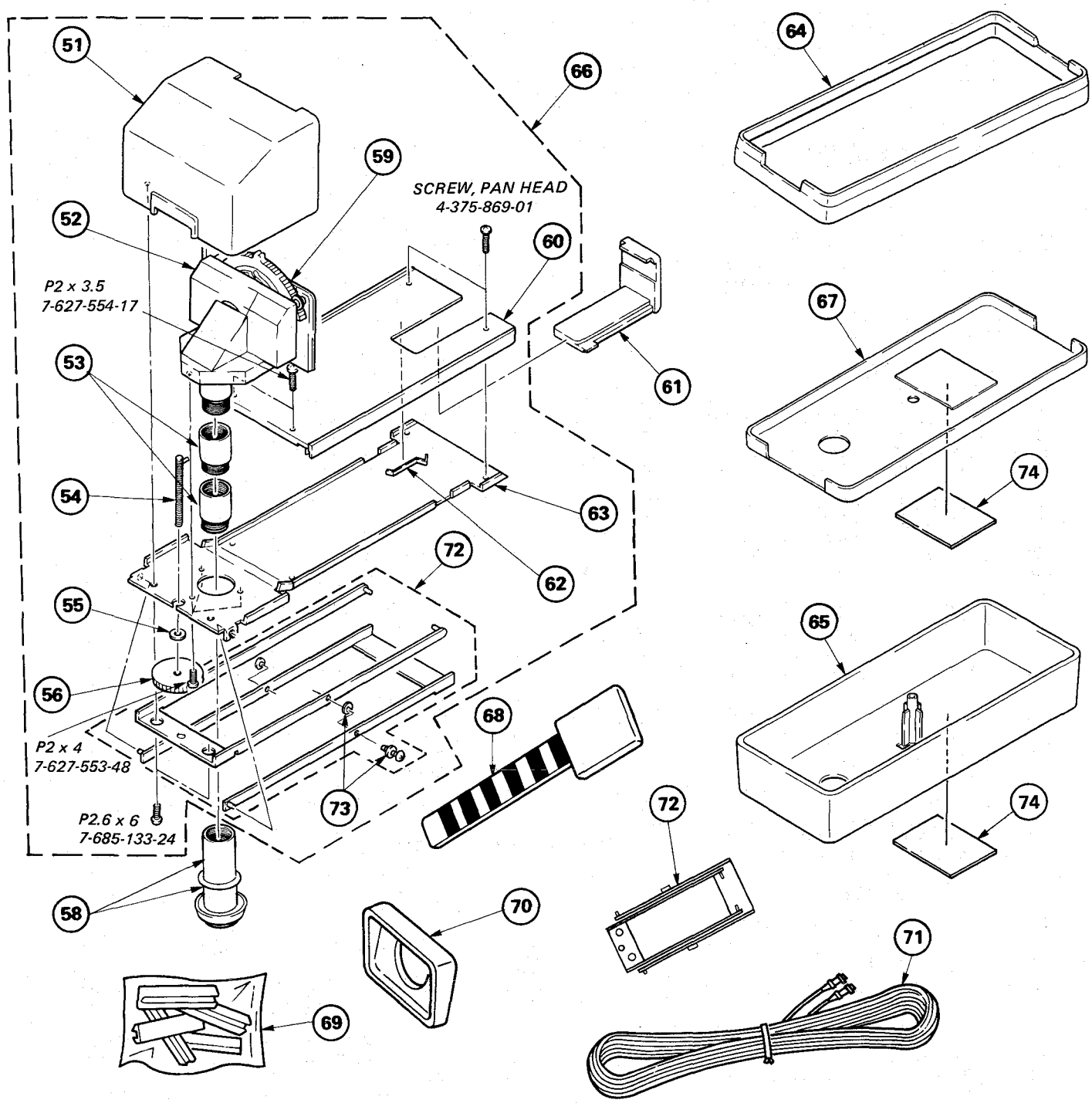
The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

4-1. CAMERA AND CAMERA BRACKET



No.	Part No.	Description	Remark
1	4-375-844-01	CASE, FRONT	
2	A-7613-058-A	LENS BLOCK ASSY	
3	8-701-037-39	TUBE, IMAGE PICKUP CT-3732	
4	1-562-919-11	SOCKET ASSY, IMAGE PICKUP TUBE	
5	4-375-843-01	COVER, MICROPHONE	
6	A-7520-229-A	PW BOARD, COMPLETE	
7	A-7520-227-A	PR BOARD, COMPLETE	
8	A-7520-228-A	DF BOARD, COMPLETE	
9	A-7520-230-A	SR BOARD, COMPLETE	
10	*4-375-859-01	SHEET, SHIELD	
11	4-375-846-21	CASE, REAR	
12	*4-375-891-01	LABEL, MODEL NUMBER	
14	X-4375-812-1	BRACKET ASSY, CAMERA	15,18-22
15	4-375-830-01	NUT, LOCK	
16	3-701-577-00	SCREW (M2×5), CAP	
17	4-375-856-01	WRENCH, L	
18	4-375-826-01	SCREW (A), LOCK	
19	*4-375-823-01	HOLDER	
20	4-375-832-01	SCREW (B), LOCK	
21	4-375-834-01	COLLAR, SPACER	
22	*4-375-872-01	SPACER PLATE	

4-2. DOOR ADAPTOR



No.	Part No.	Description	Remark
51	4-375-835-01	CASE (A), ADAPTOR	
52	*1-547-177-11	LENS, RELAY	
53	4-375-873-01	RING, EXTENSION	
54	4-375-819-01	SCREW, SLIDE	
55	4-375-866-01	WASHER SPACER	
56	4-375-818-01	NUT, ADJUSTMENT	
58	1-547-178-11	LENS ASSY, DOOR	
59	4-375-874-01	RETAINER, MOUNT	
60	*4-375-841-01	CASE (B), ADAPTOR	
61	4-375-815-01	HOOK, SLIDE	
62	4-375-817-01	SPRING	
63	*4-375-836-01	CHASSIS, BASE	
64	4-375-840-01	COVER (13), CHASSIS	
65	4-375-862-01	SPACER	74
66	*A-7613-064-A	LENS ASSY, RELAY	51-56,59,60,61,62,63,72
67	*X-4375-813-1	CHASSIS ASSY, ADAPTOR	74
68	4-375-870-01	SCALE	
69	X-4375-809-1	HANGER ASSY, CABLE	
70	4-375-861-01	HOOD, CAMERA	
71	1-558-051-11	CORD, CONNECTION 4P	
72	*X-4375-816-1	BRACKET ASSY, U	73
73	3-701-437-21	WASHER	
74	*4-375-863-01	TAPE (I), DOUBLE STICK	

SECTION 5
ELECTRICAL PARTS LIST

NOTE:

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.

- Items marked " * " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.

CAPACITORS
- MF : μF, PF : μμF

RESISTORS
- All resistors are in ohms
- F : nonflammable

COILS
- MMH : mH, UH : μH

Ref.No.	Part No.	Description			Remark
	A-7520-227-A	PR BOARD, COMPLETE **********			
	*4-375-852-01	CASE (1), SHIELD			
	*4-375-853-01	CASE (2), SHIELD			
		CAPACITOR			
C1	1-163-831-00	CERAMIC CHIP 0.047MF	10%	100V	
C2	1-163-831-00	CERAMIC CHIP 0.047MF	10%	100V	
C3	1-124-225-00	ELECT 100MF	20%	6.3V	
C4	1-163-232-00	CERAMIC CHIP 16PF	5%	50V	
C6	1-131-386-00	TANTALUM 33MF	20%	6.3V	
C7	1-131-386-00	TANTALUM 33MF	20%	6.3V	
C8	1-124-222-00	ELECT 22MF	20%	6.3V	
C9	1-163-038-00	CERAMIC CHIP 0.1MF		25V	
C10	1-124-222-00	ELECT 22MF	20%	6.3V	
C11	1-162-568-11	CERAMIC CHIP 0.33MF		25V	
C12	1-163-038-00	CERAMIC CHIP 0.1MF		25V	
C13	1-162-568-11	CERAMIC CHIP 0.33MF		25V	
C14	1-131-386-00	TANTALUM 33MF	20%	6.3V	
C15	1-163-023-00	CERAMIC CHIP 0.015MF	10%	50V	
C16	1-163-038-00	CERAMIC CHIP 0.1MF		25V	
C17	1-124-225-00	ELECT 100MF	20%	6.3V	
C18	1-124-222-00	ELECT 22MF	20%	6.3V	
C19	1-162-568-11	CERAMIC CHIP 0.33MF		25V	
C20	1-124-225-00	ELECT 100MF	20%	6.3V	
C21	1-124-222-00	ELECT 22MF	20%	6.3V	
C22	1-124-283-00	ELECT 4.7MF	20%	16V	
C23	1-124-222-00	ELECT 22MF	20%	6.3V	
C24	1-163-038-00	CERAMIC CHIP 0.1MF		25V	
C25	1-163-038-00	CERAMIC CHIP 0.1MF		25V	
		CONNECTOR			
CN1	*1-564-003-00	PIN, CONNECTOR 4P			
		DIODE			
D1	8-719-100-05	DIODE 1S2837			
		IC			
IC1	8-752-005-70	IC CX20057			
IC2	8-759-100-94	IC UPC358G2			
		COIL			
L1	1-408-948-00	MICRO INDUCTOR 220UH			
L2	1-408-982-11	MICRO INDUCTOR 100UH			
		MICROPHONE			
MIC1	8-814-189-31	MICROPHONE, BUILT-IN (C-1007D)			
		TERMINAL			
PIN1	*4-375-854-01	TERMINAL, INDEX			

Ref.No.	Part No.	Description			Remark
		TRANSISTOR			
Q1	8-729-105-53	TRANSISTOR 2SK300			
Q2	8-729-122-63	TRANSISTOR 2SA1226			
Q4	8-729-102-06	TRANSISTOR 2SC2223			
Q5	8-729-122-63	TRANSISTOR 2SA1226			
Q6	8-729-102-06	TRANSISTOR 2SC2223			
Q7	8-729-100-66	TRANSISTOR 2SC1623			
Q8	8-729-100-66	TRANSISTOR 2SC1623			
Q9	8-729-100-76	TRANSISTOR 2SA812			
Q10	8-729-100-66	TRANSISTOR 2SC1623			
Q11	8-729-100-76	TRANSISTOR 2SA812			
		RESISTOR			
R1	1-208-259-00	RES, MICRO (HIGH MEGA OHM) 10M			
R2	1-216-121-00	METAL CHIP 1M	5%	1/10W	
R3	1-216-129-00	METAL CHIP 2.2M	5%	1/10W	
R4	1-216-033-00	METAL CHIP 220	5%	1/10W	
R5	1-216-033-00	METAL CHIP 220	5%	1/10W	
R6	1-216-059-00	METAL CHIP 2.7K	5%	1/10W	
R7	1-216-077-00	METAL CHIP 15K	5%	1/10W	
R8	1-216-075-00	METAL CHIP 12K	5%	1/10W	
R9	1-216-043-00	METAL CHIP 560	5%	1/10W	
R10	1-216-021-00	METAL CHIP 68	5%	1/10W	
R11	1-216-075-00	METAL CHIP 12K	5%	1/10W	
R12	1-216-059-00	METAL CHIP 2.7K	5%	1/10W	
R13	1-216-059-00	METAL CHIP 2.7K	5%	1/10W	
R14	1-216-085-00	METAL CHIP 33K	5%	1/10W	
R15	1-216-077-00	METAL CHIP 15K	5%	1/10W	
R16	1-216-077-00	METAL CHIP 15K	5%	1/10W	
R17	1-216-081-00	METAL CHIP 22K	5%	1/10W	
R18	1-216-059-00	METAL CHIP 2.7K	5%	1/10W	
R19	1-216-047-00	METAL CHIP 820	5%	1/10W	
R20	1-216-079-00	METAL CHIP 18K	5%	1/10W	
R21	1-216-085-00	METAL CHIP 33K	5%	1/10W	
R22	1-216-075-00	METAL CHIP 12K	5%	1/10W	
R23	1-216-059-00	METAL CHIP 2.7K	5%	1/10W	
R24	1-216-049-00	METAL CHIP 1K	5%	1/10W	
R25	1-216-049-00	METAL CHIP 1K	5%	1/10W	
R26	1-216-049-00	METAL CHIP 1K	5%	1/10W	
R27	1-216-005-00	METAL CHIP 15	5%	1/10W	
R28	1-216-021-00	METAL CHIP 68	5%	1/10W	
R29	1-216-059-00	METAL CHIP 2.7K	5%	1/10W	
R30	1-216-073-00	METAL CHIP 10K	5%	1/10W	
R31	1-216-049-00	METAL CHIP 1K	5%	1/10W	
R32	1-216-089-00	METAL CHIP 47K	5%	1/10W	
R33	1-216-033-00	METAL CHIP 220	5%	1/10W	
R34	1-216-089-00	METAL CHIP 47K	5%	1/10W	
R35	1-216-005-00	METAL CHIP 15	5%	1/10W	
R36	1-216-069-00	METAL CHIP 6.8K	5%	1/10W	
R37	1-216-089-00	METAL CHIP 47K	5%	1/10W	
R38	1-216-085-00	METAL CHIP 33K	5%	1/10W	
R74	1-247-851-00	CARBON 6.8K	5%	1/8W	

Ref.No.	Part No.	Description	Remark
	A-7520-228-A	DF BOARD, COMPLETE **********	
	1-567-527-11	VIBRATOR, CRYSTAL	
		CONNECTOR	
BP1	*1-564-551-11	PIN, BOARD TO BOARD (L TYPE)9P	
BP2	*1-564-551-11	PIN, BOARD TO BOARD (L TYPE)9P	
BP4	1-564-549-11	PIN, BOARD TO BOARD(L TYPE)10P	
		CAPACITOR	
C27	1-163-232-00	CERAMIC CHIP 16PF 5%	50V
C28	1-163-232-00	CERAMIC CHIP 16PF 5%	50V
C29	1-131-386-00	TANTALUM 33MF 20%	6.3V
C30	1-163-023-00	CERAMIC CHIP 0.015MF 10%	50V
C31	1-162-568-11	CERAMIC CHIP 0.33MF	25V
C32	1-162-568-11	CERAMIC CHIP 0.33MF	25V
C33	1-162-569-11	CERAMIC CHIP 100PF 2%	50V
C34	1-162-569-11	CERAMIC CHIP 100PF 2%	50V
C35	1-163-263-00	CERAMIC CHIP 330PF 5%	50V
C36	1-163-263-00	CERAMIC CHIP 330PF 5%	50V
C37	1-124-245-00	ELECT 4.7MF 20%	35V
C38	1-124-245-00	ELECT 4.7MF 20%	35V
C39	1-136-349-11	FILM 0.022MF 2%	100V
C40	1-136-349-11	FILM 0.022MF 2%	100V
C41	1-163-038-00	CERAMIC CHIP 0.1MF	25V
C42	1-163-038-00	CERAMIC CHIP 0.1MF	25V
		IC	
IC3	8-757-930-11	IC CX7930A	
		TRANSISTOR	
Q15	8-729-100-76	TRANSISTOR 2SA812	
Q16	8-729-100-66	TRANSISTOR 2SC1623	
Q17	8-729-100-76	TRANSISTOR 2SA812	
Q18	8-729-100-66	TRANSISTOR 2SC1623	
Q19	8-729-901-04	TRANSISTOR DTA114EK	
Q20	8-729-900-53	TRANSISTOR DTC114EK	
Q21	8-729-100-76	TRANSISTOR 2SA812	
Q22	8-729-100-66	TRANSISTOR 2SC1623	
Q23	8-729-100-76	TRANSISTOR 2SA812	
Q24	8-729-100-66	TRANSISTOR 2SC1623	
Q25	8-729-901-04	TRANSISTOR DTA114EK	
Q26	8-729-900-53	TRANSISTOR DTC114EK	
Q37	8-729-901-04	TRANSISTOR DTA114EK	
Q38	8-729-901-04	TRANSISTOR DTA114EK	
		RESISTOR	
R39	1-216-121-00	METAL CHIP 1M 5%	1/10W
R40	1-216-081-00	METAL CHIP 22K 5%	1/10W
R41	1-216-121-00	METAL CHIP 1M 5%	1/10W
R43	1-216-049-00	METAL CHIP 1K 5%	1/10W
R46	1-235-552-11	NETWORK, RES, THICK FILM	
R47	1-216-530-00	METAL CHIP 390K 1%	1/10W
R48	1-235-551-11	NETWORK, RES, THICK FILM	
R49	1-235-552-11	NETWORK, RES, THICK FILM	
R68	1-216-097-00	METAL CHIP 100K 5%	1/10W
R69	1-216-097-00	METAL CHIP 100K 5%	1/10W
R70	1-216-073-00	METAL CHIP 10K 5%	1/10W
R71	1-216-075-00	METAL CHIP 12K 5%	1/10W
R72	1-216-075-00	METAL CHIP 12K 5%	1/10W
R73	1-216-543-11	METAL CHIP 1M 1%	1/10W
		**********	
	A-7520-229-A	PW BOARD, COMPLETE **********	
		CAPACITOR	
C44	1-124-245-00	ELECT 4.7MF 20%	35V
C45	1-136-348-11	FILM 0.01MF 2%	100V
C46	1-124-225-00	ELECT 100MF 20%	6.3V
C47	1-124-225-00	ELECT 100MF 20%	6.3V
C48	1-108-421-00	MYLAR 0.01MF 10%	200V
C49	1-136-350-11	FILM 0.01MF 10%	400V
C50	1-163-831-00	CERAMIC CHIP 0.047MF 10%	100V
C51	1-124-245-00	ELECT 4.7MF 20%	35V
C52	1-124-245-00	ELECT 4.7MF 20%	35V
C53	1-124-222-00	ELECT 22MF 20%	6.3V
C54	1-163-038-00	CERAMIC CHIP 0.1MF	25V
C55	1-162-568-11	CERAMIC CHIP 0.33MF	25V
C59	1-163-023-00	CERAMIC CHIP 0.015MF 10%	50V
		DIODE	
D4	8-719-100-05	DIODE 1S2837	
D5	8-719-901-83	DIODE 1SS83	
D6	8-719-903-29	DIODE ERB43-04	
D7	8-719-100-05	DIODE 1S2837	
		COIL	
L3	1-407-165-XX	MICRO INDUCTOR 47UH	
		TRANSISTOR	
Q27	8-729-100-76	TRANSISTOR 2SA812	
Q28	8-729-301-25	TRANSISTOR 2SD1368	
Q29	8-729-103-72	TRANSISTOR 2SD1005	
Q30	8-729-100-66	TRANSISTOR 2SC1623	
Q31	8-729-100-66	TRANSISTOR 2SC1623	
Q32	8-729-100-66	TRANSISTOR 2SC1623	
Q33	8-729-100-66	TRANSISTOR 2SC1623	
Q34	8-729-900-53	TRANSISTOR DTC114EK	
		RESISTOR	
R51	1-216-047-00	METAL CHIP 820 5%	1/10W
R52	1-216-073-00	METAL CHIP 10K 5%	1/10W
R53	1-216-129-00	METAL CHIP 2.2M 5%	1/10W
R54	1-216-121-00	METAL CHIP 1M 5%	1/10W

Ref.No.	Part No.	Description				Remark
R55	1-216-059-00	METAL CHIP	2.7K	5%	1/10W	
R56	1-216-081-00	METAL CHIP	22K	5%	1/10W	
R57	1-216-077-00	METAL CHIP	15K	5%	1/10W	
R58	1-216-097-00	METAL CHIP	100K	5%	1/10W	
R59	1-216-085-00	METAL CHIP	33K	5%	1/10W	
R60	1-216-069-00	METAL CHIP	6.8K	5%	1/10W	
R61	1-216-069-00	METAL CHIP	6.8K	5%	1/10W	
R67	1-216-085-00	METAL CHIP	33K	5%	1/10W	
		VARIABLE RESISTOR				
RV1	1-228-999-00	RES, ADJ, CARBON 500K				
RV2	1-230-582-11	RES, ADJ, CARBON 100K				
		TRANSFORMER				
T1	⚠1-439-367-11	TRANSFORMER, FLYBACK				
**********						
	A-7520-230-A	SR BOARD, COMPLETE				
		**********				
	1-562-892-11	SOCKET, ROUND CONNECTOR 4P				
	*4-375-855-01	HEAT SINK				
		CAPACITOR				
C56	1-124-225-00	ELECT	100MF	20%	6.3V	
C57	1-162-568-11	CERAMIC CHIP	0.33MF		25V	
C58	1-124-236-00	ELECT	47MF	20%	16V	
		DIODE				
D8	8-719-105-38	DIODE RD3.0M-B1				
D9	8-719-100-05	DIODE 1S2837				
		TRANSISTOR				
Q35	8-729-100-66	TRANSISTOR 2SC1623				
Q036	8-729-177-23	TRANSISTOR 2SB772				
		RESISTOR				
R62	1-216-077-00	METAL CHIP	15K	5%	1/10W	
R63	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R64	1-216-043-00	METAL CHIP	560	5%	1/10W	
R65	1-216-049-00	METAL CHIP	1K	5%	1/10W	
R66	1-216-097-00	METAL CHIP	100K	5%	1/10W	
		VARIABLE RESISTOR				
RV3	1-228-993-00	RES, ADJ, CARBON 5K				
		SWITCH				
SW1	1-570-266-11	SWITCH, PUSH (1 KEY)				

Ref.No.	Part No.	Description	Remark
		MISCELLANEOUS	
		**********	
	⚠1-463-712-11	ADAPTOR, AC (AC-40E)	
	1-558-051-11	CORD, CONNECTION 4P	
	1-562-919-11	SOCKET ASSY, IMAGE PICKUP TUBE	
	8-701-037-39	TUBE, IMAGE PICKUP CT-3732	
C26	1-136-350-11	CAP, FILM 0.01MF 10% 400V	
D2	8-719-812-26	DIODE TLR226	
		ADAPTOR, DOOR	
	*1-547-177-11	LENS, RELAY	
	1-547-178-11	LENS ASSY, DOOR	

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ACCESSORIES AND PACKING MATERIALS

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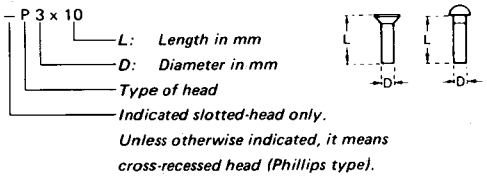
Part No.	Description	Remark
2-274-309-00	BAG, PROTECTION	
4-375-870-01	SCALE	
4-375-877-01	TRAY (B)	
4-375-878-01	TRAY (A)	
*4-379-343-01	INDIVIDUAL CARTON	
4-482-102-61	MANUAL, INSTRUCION	

NOTE:

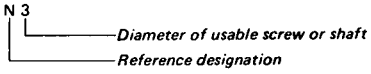
The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

HARDWARE NOMENCLATURE

Screw:



Nut, Washer, Retaining ring:



Reference Designation	Shape	Description	Remarks
SCREWS			
P		pan-head screw	binding-head (B) screw for replacement
PWH		pan-head screw with washer face	binding-head (B) screw and flat washer for replacement
PS PSP		pan-head screw with spring washer	binding-head (B) screw and spring washer for replacement
PSW PSPW		pan-head screw with spring and flat washers	binding-head (B) screw and spring and flat washers for replacement
R		round-head screw	binding-head (B) screw for replacement
K		flat-countersunk-head screw	
RK		oval-countersunk-head screw	
B		binding-head screw	
T		truss-head screw	binding-head (B) screw for replacement
F		flat-fillister-head screw	
RF		fillister-head screw	
BV		brazier-head screw	

Reference Designation	Shape	Description	Remarks
SELF-TAPPING SCREWS			
TA		self-tapping screw	ex: TA, P 3 x 10
PTP		pan-head self-tapping screw	binding-head self-tapping (TA, B) screw for replacement
PTPWH		pan-head self-tapping screw with washer face	binding-head self tapping (TA, B) screw and flat washer for replacement
PTTWH		pan-head thread-rolling screw with washer face	binding-head (B) screw and flat washer for replacement
SET SCREWS			
SC		set screw	
SC		hexagon-socket set screw	ex: SC 2.6 x 4, hexagon socket
NUT			
N		nut	
WASHERS			
W		flat washer	
SW		spring washer	
LW		internal-tooth lock washer	ex: LW3, internal
LW		external-tooth lock washer	ex: LW3, external
RETAINING RINGS			
E		retaining ring	
G		grip-type retaining ring	